

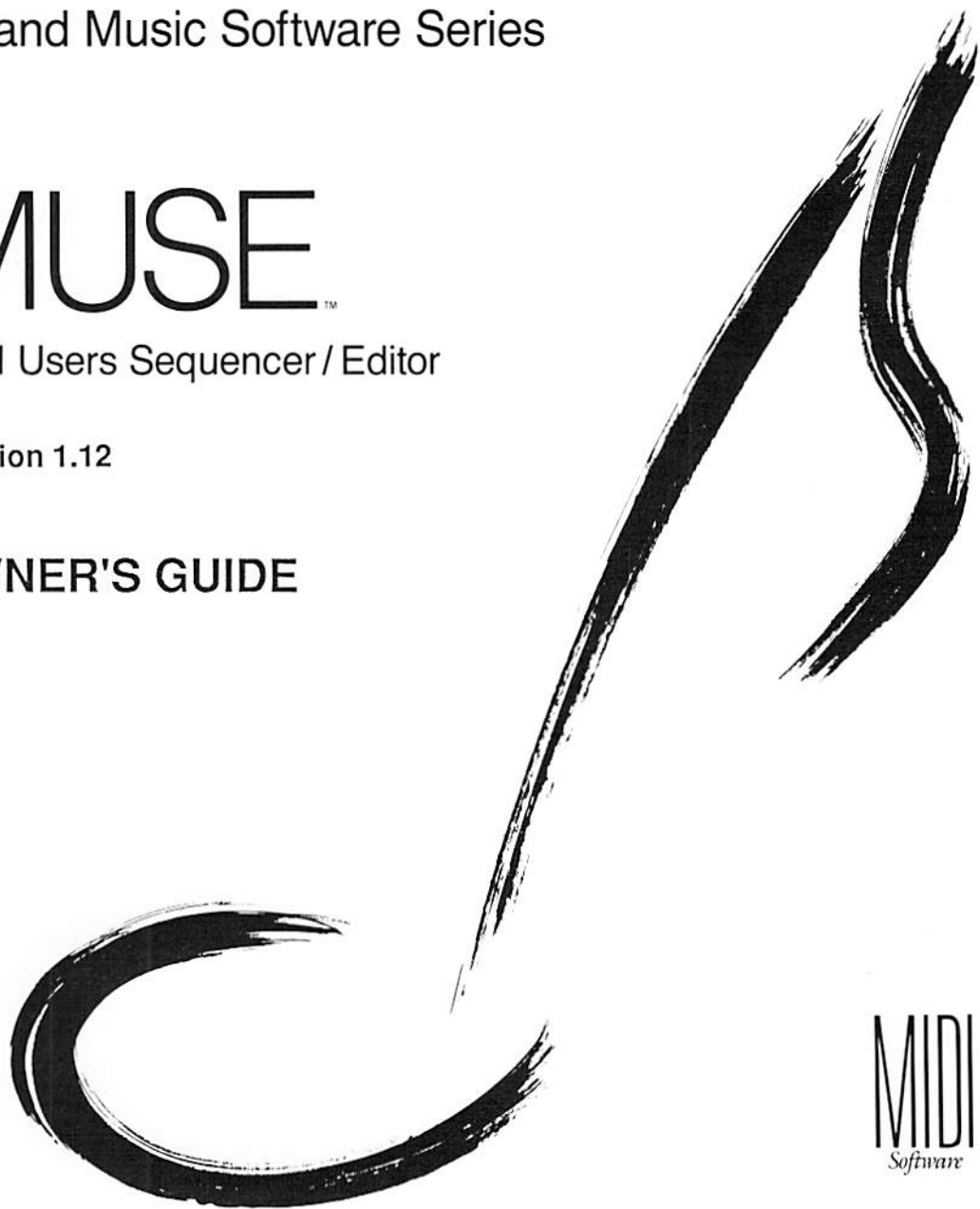
Roland Music Software Series

MUSE™

MIDI Users Sequencer / Editor

Version 1.12

OWNER'S GUIDE



MIDI
Software

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INTRODUCTION

You are about to embark upon an adventure in creativity called **MUSE**. Artists and scientists both agree that creative activity has much in common with play, and though you'll find MUSE is fun to use (you can even operate it with a joystick), it is not a game. MUSE is a musical toolkit. Its name says it all:

MIDI Users Sequencer/Editor.

MIDI-- Musical Instrument Digital Interface-- is probably the most significant advancement in electronic music since the integrated circuit. MIDI provides the common communications link that enables instruments from different manufacturers to exchange musical information, be they keyboards, guitars, rhythm machines, signal processing devices-- whatever. You'll find most every important electronic device made to generate or process electronic musical sounds will include MIDI, and that MUSE has been developed to take full advantage of these MIDI capabilities.

Users-- that means you! MUSE was designed to work with you by being fast, by being easy to learn and use, and by anticipating the decisions you'll want to make at each step in your music-making process. The author of MUSE is a musician first, who relied on constant testing and feedback from other working musicians at every stage of the program's development. You are part of an emerging group of artists today who are actively exploring new and better methods to write and produce music: MUSE was created to respond to your musical needs.

Sequencer it is, but you shouldn't misunderstand that to mean that the music created with MUSE will have a "machine-like" quality-- quite the contrary. MUSE digitally records everything you play on your MIDI instruments in the form of MIDI data, including all nuances of

expression, aftertouch, modulation wheel, even patch program changes, on up to eight tracks. Any MIDI instruments can play back music recorded this way, which you can then tape record in the standard fashion. As you will discover, MUSE provides a flexibility and degree of control that isn't possible using a traditional tape-based recording system alone. When you learn to use both in conjunction, however, you multiply the power of each and will extend your creative reach that much further.

Editor it is too: After your music is recorded as MIDI sequences you can rearrange, transpose, merge, chain, and loop both individual measures and entire tracks. This manual explains such things as how to punch in and out by measure, how to use the auto-correct feature to correct timing mistakes in your recorded sequences, how to change MIDI channel settings, how to use the various external synchronization modes available, and more. Since MUSE is a microcomputer-based system, its cut-and-paste style editing provides you with a greater degree of compositional power than is otherwise possible using a dedicated sequencer.

To take full advantage of MUSE it is important that you read this manual. The first part describes how to use each function on the MUSE command screen, followed by an explanation of the Extras provided. The section titled "A User's Musings" covers in a step-by-step way some typical applications from a working musician's point of view. Following this, other applications and some specific program functions are discussed in more detail. A Glossary and Index are also provided for your reference.

A manual such as this can only begin to address the questions that may arise as you explore what MUSE has to offer. For this reason we encourage you to contact Roland directly if you have any questions about MIDI in general or about using MUSE in particular. The Roland Users Group magazine, which you will receive upon signing and returning the MUSE Warranty Agreement,

also provides an excellent source of information on MIDI applications as well as Roland product support.

Now your adventure with MUSE is about to begin. . . and although it won't make you any more creative than you already are, you'll discover that MUSE allows you to express your creativity in ways you may never have thought possible.

AN OVERVIEW OF MUSE

- * 8 tracks of recording and overdubbing
- * 6,000 note capacity (approximately)
- * Record with metronome or in free time
- * Choice of time signature
- * Channelizing, transposing, erasing and muting of individual tracks
- * Auto-correct with no effect on articulation, pitch bending, or use of other controllers
- * Filters for aftertouch, patch changes, and modulation wheel both while recording or while copying
- * Auto-locating
- * Looping
- * Chaining of tracks
- * Cut-and-paste style editing for rearrangement, inserting, deleting, or moving of any measures
- * Automatic punching in and out by measure
- * Merging of tracks while retaining MIDI channel information
- * Tempo selectable from 20 to 240
- * Internal, MIDI, and tape sync

WHAT YOU WILL NEED

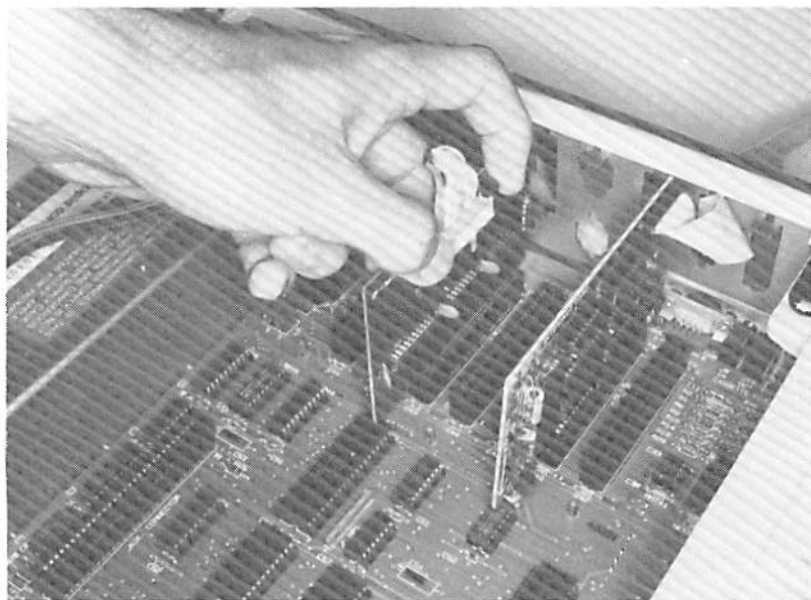
- * Apple IIc *, IIe or II+, or Commodore 64 or 128 computer (64K minimum)
 - * Monochrome or color monitor
 - * 1 Disk Drive
 - * Roland MPU-401 MIDI Processing Unit with interface card, MIF-APL
 - * MIDI synthesizer and 2 MIDI cables (minimum)
 - * Blank initialized disks for music data storage
 - * Joystick, paddle, or similar input device (optional)
- * Apple IIc interface is available from J.L. Cooper Electronics.

INSTALLING THE MPU-401 MIDI PROCESSING UNIT

1. Make sure the power switch on the computer is turned OFF.
2. Remove the cover of the computer, revealing the internal motherboard with its row of slots positioned at the back. Double check the power: Make sure the internal power light is OFF.
3. Touch the power supply case inside on the left to discharge any static electricity that may be on you or your clothes.
4. Thread the connecting cable through an opening at the back of the computer, attaching the smaller jack to the green slot card.



5. Gently insert the slot card into any free slot at the back of the computer's motherboard so that the cable connection is positioned toward the right hand side of the card.

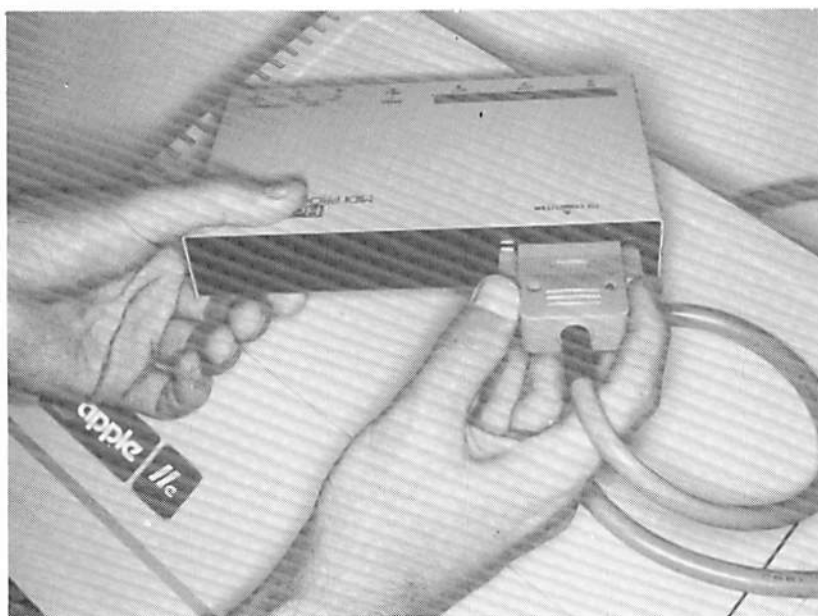


Make a note of the slot you have selected.
Replace the cover on the computer.

6. Attach the other end of the cable to the MPU-401 MIDI Processing Unit.

NOTE: Never connect or disconnect this cable from the MPU-401 while the computer's power is turned on.

7. Connect the MIDI Out jack on your MIDI instrument to the MIDI In jack on the MPU-401, and connect the MIDI In jack on your instrument to one of the MIDI out jacks on the MPU-401 using two MIDI cords with male five-pin DIN plugs on each end. After connecting your instrument to an audio amplifier, turn it on and you're ready to begin using MUSE. It is recommended you turn your MIDI synthesizer on before turning on the computer to load MUSE.



LOADING THE MUSE PROGRAM DISK

1. If you intend to use paddles or a joystick to operate MUSE, connect them to your computer before loading the program. If you have not turned on your MIDI synthesizer yet, do so now.
2. With the computer's power turned off, insert the MUSE program disk into disk drive 1 and close the drive door.
3. Turn the computer on. If you find you've inserted the program disk into the wrong drive, turn the computer off, insert the disk into the correct drive, close the drive door, then turn the computer on again.

NOTE: Do not try to switch disks while the drive light is on. Do not press the Reset key when the program is loading and the disk drive light is on.

4. When MUSE has been loaded a title page will appear showing the version number of the program. (The title page can be skipped by pressing the space bar at any time while the page is loading. If you want the title page to remain on the screen press Escape as it is loading. It will then remain on the screen until another key is pressed.)

Next you will be asked, "Which slot is the MPU in?" Press the number on the computer keyboard that corresponds to the slot the MPU-401 slot card is in. There is no need to press Return. In other words, if you installed the MPU-401 slot card in slot number 5 of your computer, press the number 5. After you have done this, the MUSE command screen will appear. You should now remove the MUSE program disk from the disk drive and set it aside in a safe place.

(The MUSE program disk is write-protected and should not be used as a data disk.)

5. Next, insert into drive 1 a disk that has been properly initialized. This will be used as a file disk for saving the music files you create with MUSE. Always make back-ups of disks in the event of damage or accidental loss of data. (You can continue to use MUSE now, but you will not be able to save music data to disk until you have created an initialized song file data disk. Refer to the owner's manual for your computer on how to initialize and back-up disks.)
6. It is a good idea to keep at least one extra initialized disk handy in the event you run out of disk space.

"POINTING AND CLICKING"

MUSE uses a very consistent visual approach throughout. Once you've learned to use one function, the operation of most all the others is learned as well. You select any function by first pointing to it using the cursor control keys on the computer keyboard, or by using a joystick or paddles, to highlight it. Once a function is highlighted it can be selected by pressing the space bar or "clicking" with the joystick or paddle button. Any function that's used to work on music tracks opens up a window, and inside the window is a display of the tracks, which looks like this:

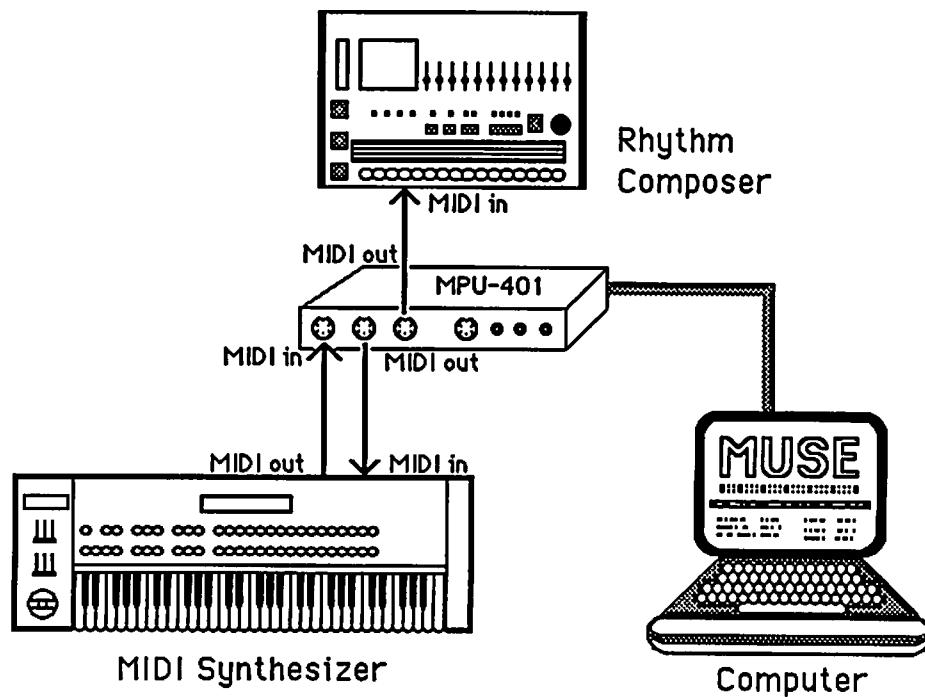
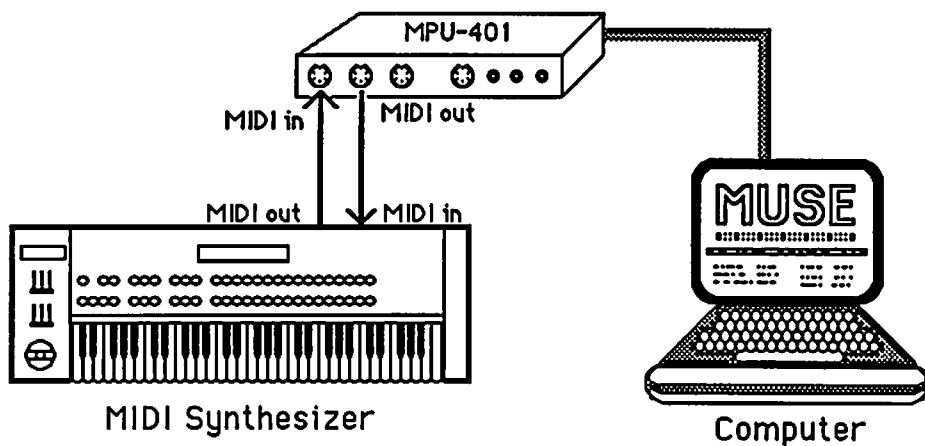
1::2::3::4::5::6::7::8::EXIT
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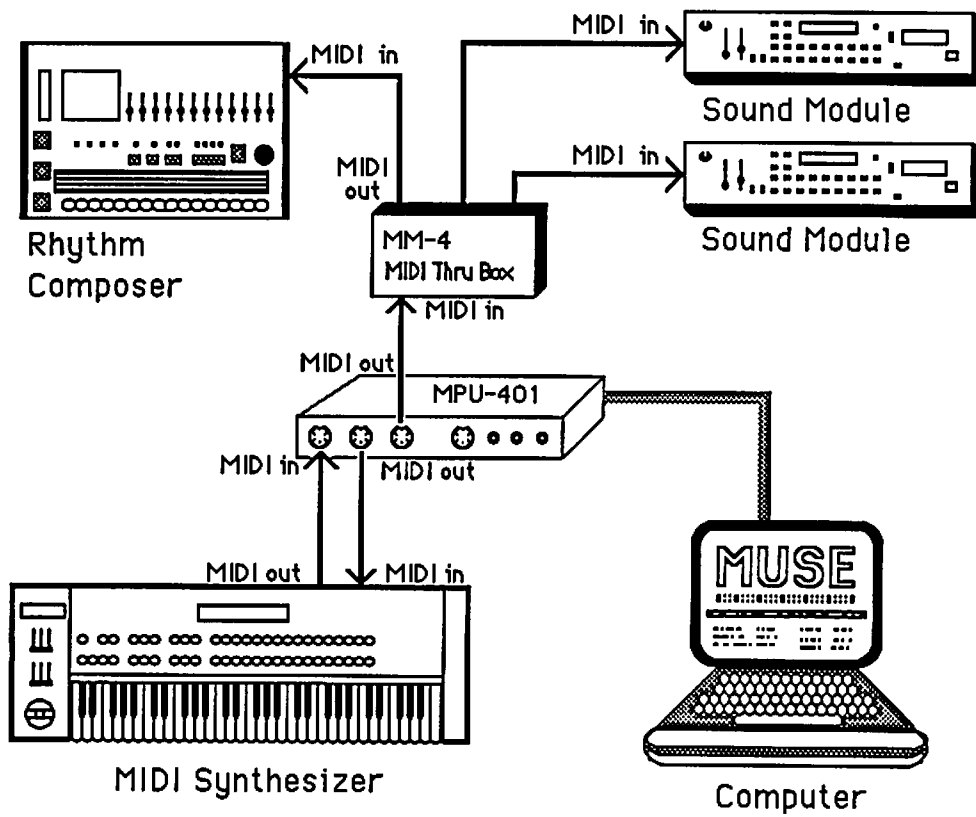
The numbers represent the tracks of MUSE's eight track sequencer. If a track has music in it, the number of that track will be lit up. Below the tracks is a pointer. The cursor control keys (or joystick, or paddles) can slide this pointer left and right. By pointing to a certain track and pressing the space bar or joystick/paddle button you select that track for action. You can either move data to it (recording, merging, and copying) or change the data in it (channelize, erase, or transpose). If MUSE asks you to select an empty track, for example, you will find that you will not be able to point to a full one and vice versa. Other functions use the same "slider" approach to select things like auto-correct resolution, time signatures, track muting, and so forth. Once you have the feel of the "sliders," you have opened up all of MUSE for fast access.

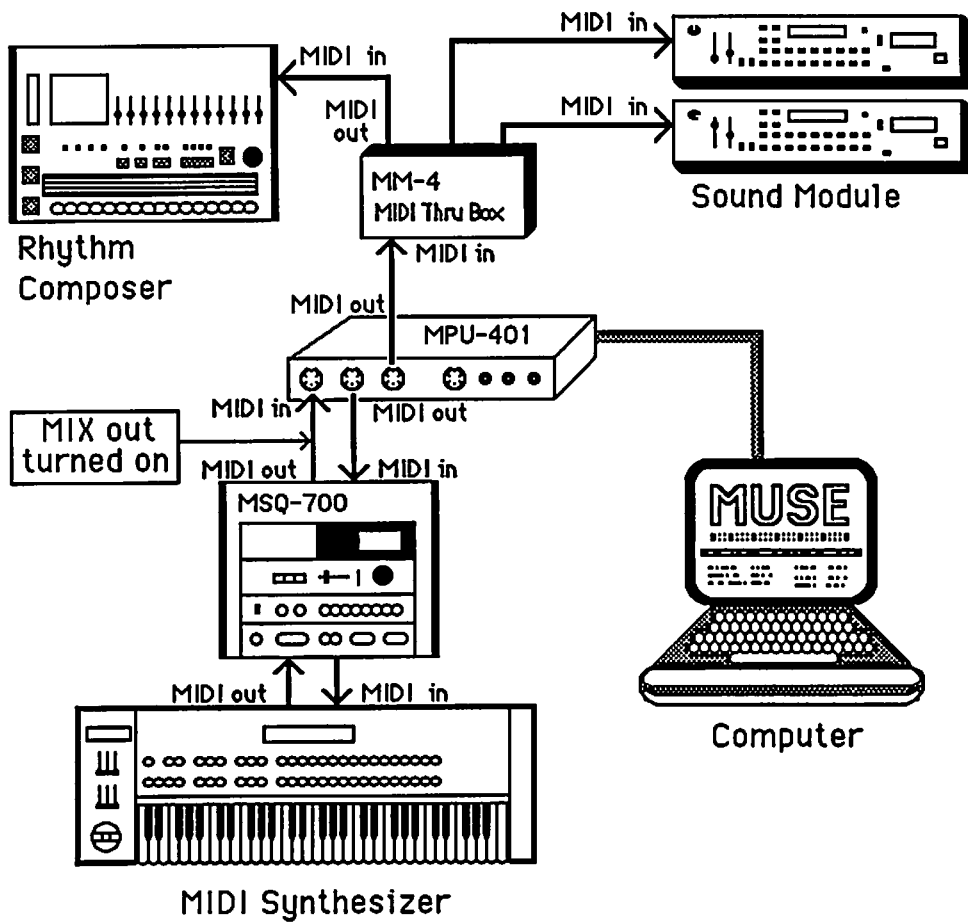
Besides being able to type in numbers from the computer keyboard, you can also use the joystick or paddles to enter numbers into MUSE. This would be used for things like determining a new tempo, setting up how many bars to record, auto-locating to a particular measure for playback, or selecting a measure number for editing. In these cases the paddle knob or joystick can be used just like any dial for selecting a value. Once a number is selected, to enter it you must click the joystick button or press the Return key. If you begin entering a number with the

joystick or paddles, MUSE will not accept any further entries from the keyboard until you have "clicked" with the joystick or paddle button. Similarly, if you started entering a number from the keyboard, you must complete that entry process from the keyboard. You will find that MUSE does not let you select an incorrect number. For example, if you have recorded 80 measures of music in MUSE and you use the joystick to auto-locate a measure in the song, the counter will go only as far as 80, the total number of measures recorded. This also applies to other MUSE functions.

Though the entire program can be run from the computer keyboard, the real speed of MUSE comes with using a hand-controller like the joystick or paddles. Of the various possible interface devices available, the fastest for MUSE seems to be the paddles. Since it is a single knob with a single button, it's hard for you to make any mistakes with this simple arrangement.

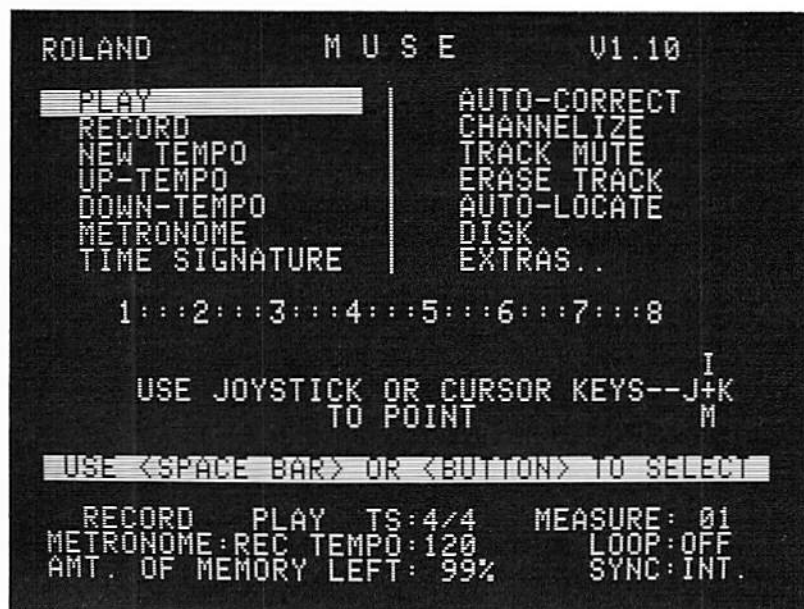






A FIRST LOOK AT MUSE

When MUSE has been properly loaded and you have indicated which slot the MPU-401 is in, the command screen will appear. MUSE is operated entirely by choosing selections from the command screen.

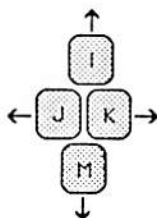


The top half of the command screen is the menu of functions that you choose from to use MUSE.

Directly below that, the numbers 1 through 8 represent the eight tracks you can record on.

Next, there is a reminder that you can use a joystick or the cursor control keys (I, J, K, M) to point to any function on the menu, highlighting it. (On the Commodore 64, Apple IIe and IIc the directional arrow keys can also be used to point to functions.)

To select any function, first point to it, then click the joystick button or press the space bar to use it. MUSE is

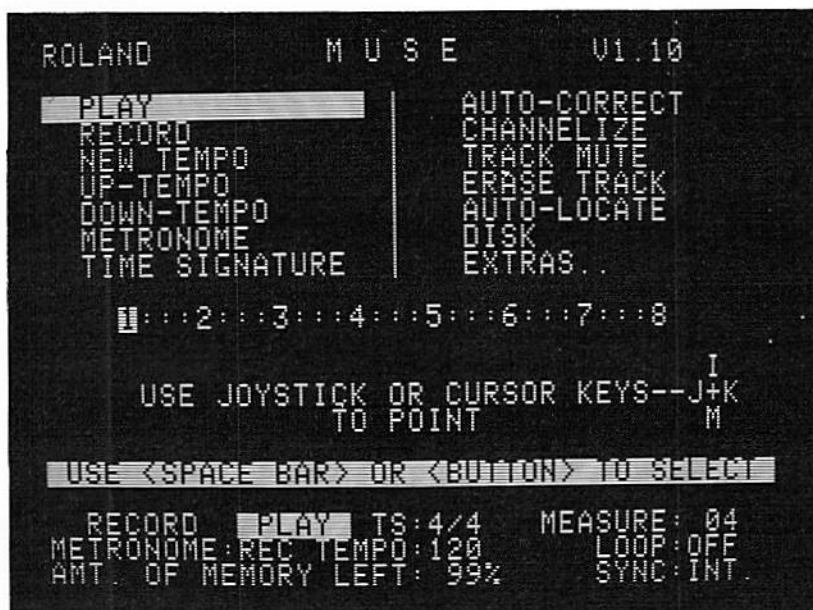


completely operated from the command screen by first pointing to a function to highlight it, and then "clicking" to select it. This "point and click" approach is consistent through- out, whether you choose to operate MUSE with a joystick or from the computer keyboard. Try moving around the menu using either the joystick or cursor control keys (or the arrow keys).

The area at the bottom of the command screen shows some current information about the various functions that is helpful to know when working with MUSE, such as the amount of free memory left for recording or editing tracks. Each function is set to a standard value when you first load the MUSE program disk. This is called a default value. The functions shown in the picture at the bottom of the command screen are set to their default values. This area will be explained in greater detail as you go on.

There are times when MUSE will ask for a number, such as measure number or tempo. Numbers may be entered using paddles or a joystick, or from the computer keyboard. If you enter a number using the joystick or paddles, you must click the joystick (or paddle) button when finished to let MUSE know you are ready to continue. If you enter a number from the computer keyboard, you may click the joystick (or paddle) button or press the Return key when you are ready to continue. If you begin entering a number with the joystick (or paddles), MUSE will not accept any further entries from the keyboard until you have clicked with the joystick (or paddle) button. Similarly, if you start entering a number from the keyboard, you must complete that entry process from the keyboard. The instances requiring the input of a number will be explained in greater detail as you read on.

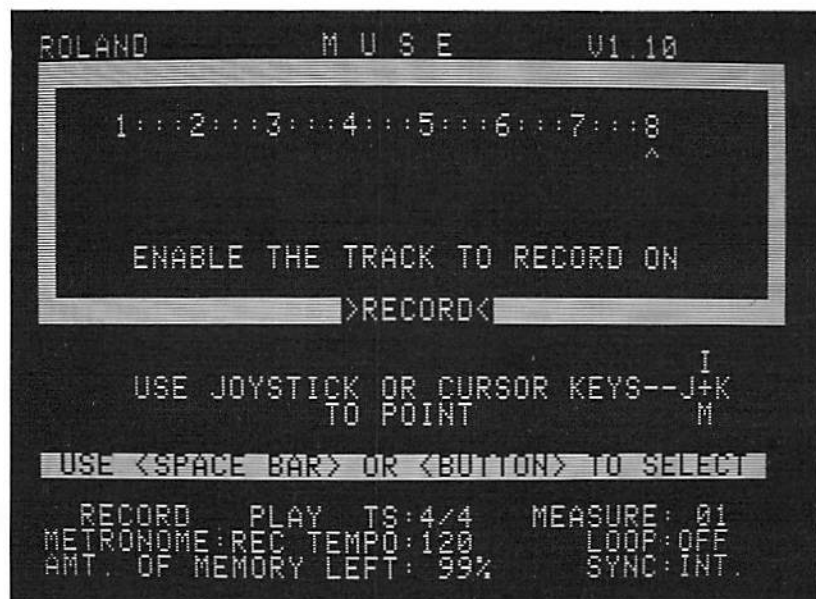
PLAY



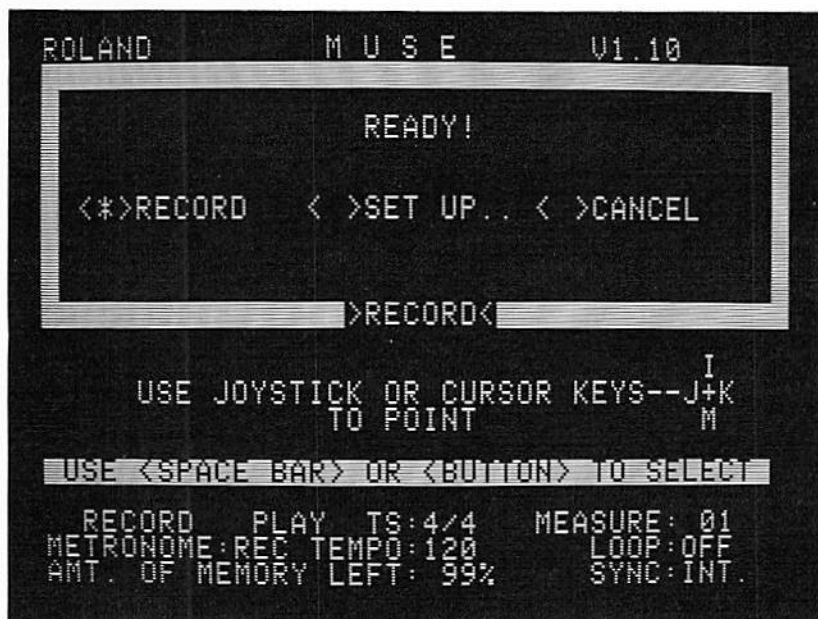
You may select the PLAY function by pointing to it and clicking with the joystick button, or by using the cursor control keys and space bar. When MUSE is playing, the word PLAY at the bottom of the command screen lights up and the measure counter will increment as measures are played. If a music file has not been loaded into the computer's memory nothing will happen when you select PLAY. Music must be recorded using the RECORD function or loaded from disk before it can be played back. The joystick and cursor keys control the tempo during playback. After playback has ended, they resume control of the on-screen cursor.

RECORD

By pointing to and selecting the RECORD function you will be presented with the Record Window. Anytime MUSE requires more input from you in order to proceed, a window will appear.



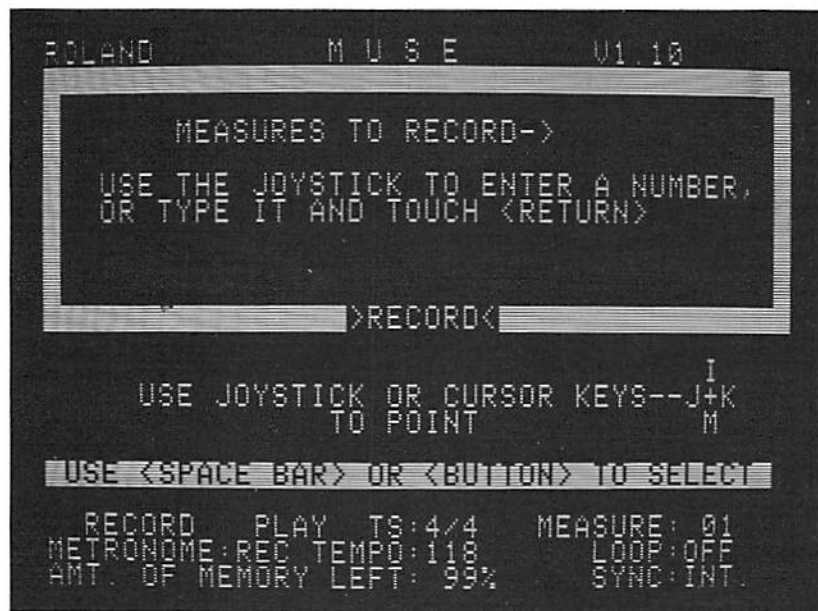
The Record Window allows you to select the track you want to record on. To select an empty track, point to a track number (1 through 8), then enable it by clicking (with the joystick button or space bar). MUSE is ready, but before the recording process actually begins, you are given three options:



1. Selecting Record allows you to directly proceed with the recording process. The built-in metronome in the MPU-401 will play a count-in of two measures before the actual first measure to be recorded begins.

(If you are in MIDI or TAPE sync mode, or if you have turned off the metronome, there will not be a two bar count-in. See more about this in the sections on METRONOME and SYNC MODE.)

By directly choosing this option, you can record music tracks by playing on your MIDI instrument for up to 250 measures (or until memory is full). You can terminate recording anytime by either clicking the joystick button or pressing the space bar. While recording, the word RECORD at the bottom of the command screen lights up and the measure counter will increment after the two measure count-in.



2. Selecting Set Up allows you to choose the number of measures you want to record before you begin recording. When the number of measures you've chosen has elapsed, MUSE will automatically stop recording. MUSE will remember that number until you select Set Up again to reset the number of measures to be recorded. In many cases, you may want to select Set Up to determine the length of a recording before you begin. Otherwise, just select the Record option directly. You always have the option to terminate the recording of a track before it is finished by either clicking the joystick button or pressing the space bar.

If other tracks have been previously recorded and you select Set Up before recording a new track, MUSE will first ask which measure you want to start recording from. In this case, you can choose to begin your recording from any point by entering the measure number that you want the new track to start recording from. This allows you to begin recording a track from the middle. (This is useful if the measures up to the point you wish to

begin recording are rests, or if you wish to punch-in a particular measure in the middle of a piece. See more about this in the sections on COPY/EDIT and COPY/CHAIN.)

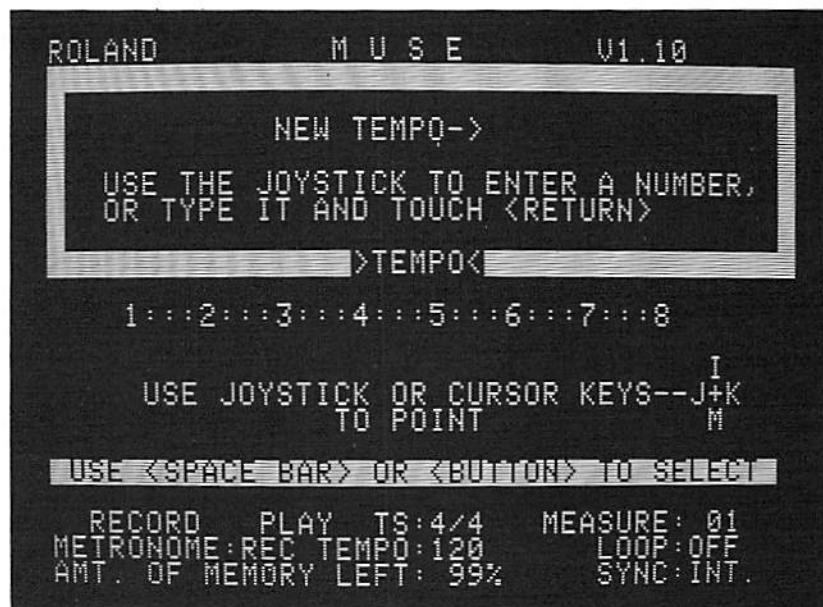
When you choose to start recording at a measure other than 1, MUSE will automatically auto-locate two bars before your requested measure, begin playing, and then record from your selected measure for the number of measures you determined. (Because of this "roll back" feature in RECORD mode, it's not possible to begin recording a punch-in from measure 2 or measure 3.)

Next, you will be asked how many measures you want to record. MUSE will automatically stop recording after the number of measures you select. For example, if you do a Set Up and tell MUSE to begin recording at measure 16 and to record for four measures, upon selecting Record MUSE will auto-locate to measure 14 and begin playing. At measure 16 it will punch you in and at measure 20 (four bars later) it will stop. Until you select another track you will remain auto-located at bar 14 so that upon playback you may quickly review the new recording. Remember, you can input numbers, such as measure numbers, by using either the joystick (followed by a button click), or from the computer keyboard (followed by pressing Return or a joystick button click).

After your Set Up selections are completed you are ready to select the Record option. Click the joystick button or press the space bar to begin. As before, the built-in metronome will play a count-in of two measures of rest before the actual first measure of the recording begins (or you will be "rolled back" two measures if you are starting from a measure other than 1). As with PLAY, the joystick and cursor keys control the tempo of the music. When recording is finished they resume control of the on-screen cursor movement.

3. Selecting Cancel permits you to return to the command screen, cancelling the recording process.

NEW TEMPO



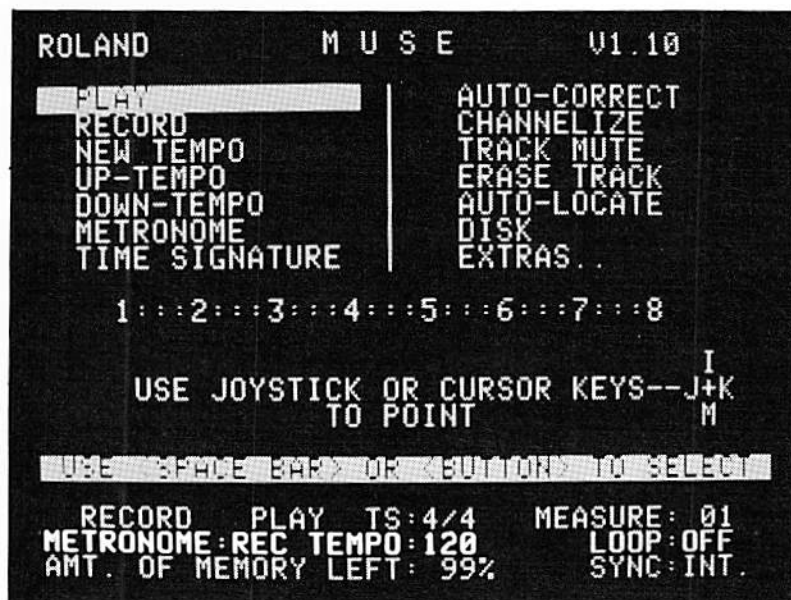
By pointing to the NEW TEMPO function and clicking the joystick button or pressing the space bar you will be presented with the Tempo Window. The Tempo Window allows you to choose the tempo of a piece of music during recording and playback. You can input numbers such as tempo numbers by using either the joystick (followed by a button click), or from the computer keyboard (followed by pressing Return or a joystick button click). The tempo you choose can be heard in the MPU-401's audible metronome and is indicated at the bottom of the command screen. (See the section on the METRONOME function.)

The tempo setting range is from 20 to 240 beats per minute. The tempo you select for a recording will be saved to disk along with those recorded sequences. (See the section on the DISK function.)

UP-TEMPO and DOWN-TEMPO

Selecting the UP-TEMPO or DOWN-TEMPO functions allows you to increment the current tempo by one beat, up or down. You can hear the change in tempo in the metronome and see it at the bottom of the command screen. These functions are useful for "fine tuning" a tempo that has been selected with the NEW TEMPO function. (See the section on Tape Synchronization for using tempo variation with MUSE's sync-to-tape features.)

METRONOME



A metronome is an audible indicator of the tempo of a piece of music, how fast or how slow it is to be recorded

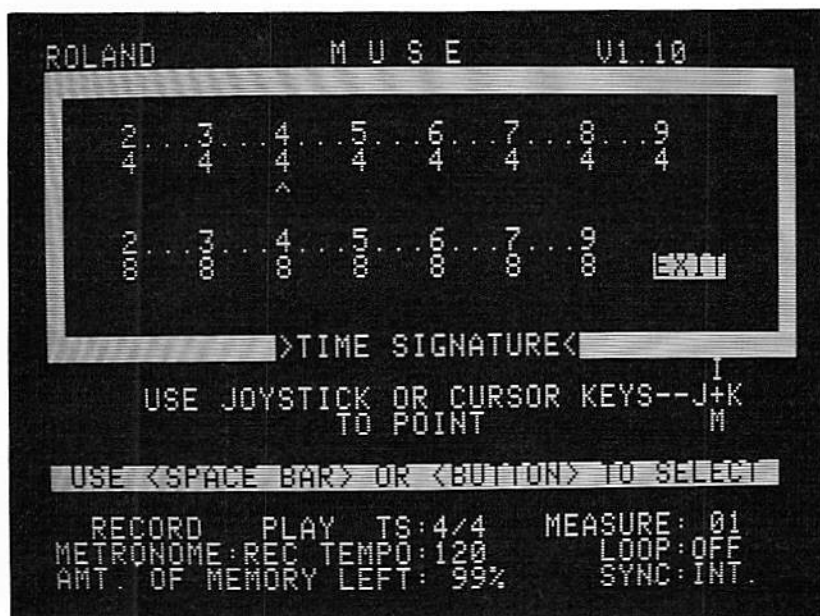
or played. Selecting the METRONOME function allows you to toggle between three options:

1. METRONOME:REC - the metronome is audible only while you are recording and during the two lead-in measures;
2. METRONOME:OFF - the metronome is turned off at all times;
3. METRONOME:ON - the metronome is audible at all times.

In most situations, you will find it useful to use the METRONOME:REC setting. Use the METRONOME:ON setting to preview a new tempo before recording, or for checking the rhythmic accuracy of a recording during playback. METRONOME:OFF can be used to record music in free time and omits the two bar count-in before recording begins.

Metronome settings are indicated at the bottom of the command screen. When you first load MUSE into the computer the tempo is automatically set at 120 beats per minute, and the metronome is set to METRONOME:REC. (These are default settings.)

TIME SIGNATURE



By pointing to the TIME SIGNATURE function and clicking the joystick button or pressing the space bar you will be presented with the Time Signature Window, which allows you to choose from a range of time signature values. Before recording any music you should select an appropriate time signature. When you first load MUSE into the computer, the time signature is automatically set to 4/4 time. This is a default setting and is indicated at the bottom of the command screen.

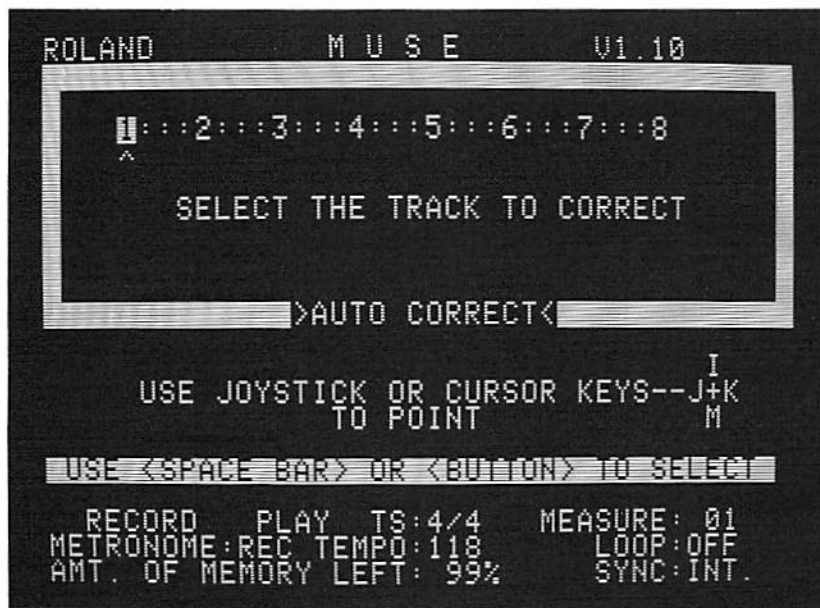
A time signature can be changed only when all tracks are empty, that is, before anything has been recorded or loaded. To select the time signature for a piece of music, point to your choice before you record, then click with the joystick button or space bar. It is not possible to mix time signatures in a piece of music; only a single time signature can be used in music recorded with MUSE. The time signature you select is stored along

with recorded sequences when you save them to disk.

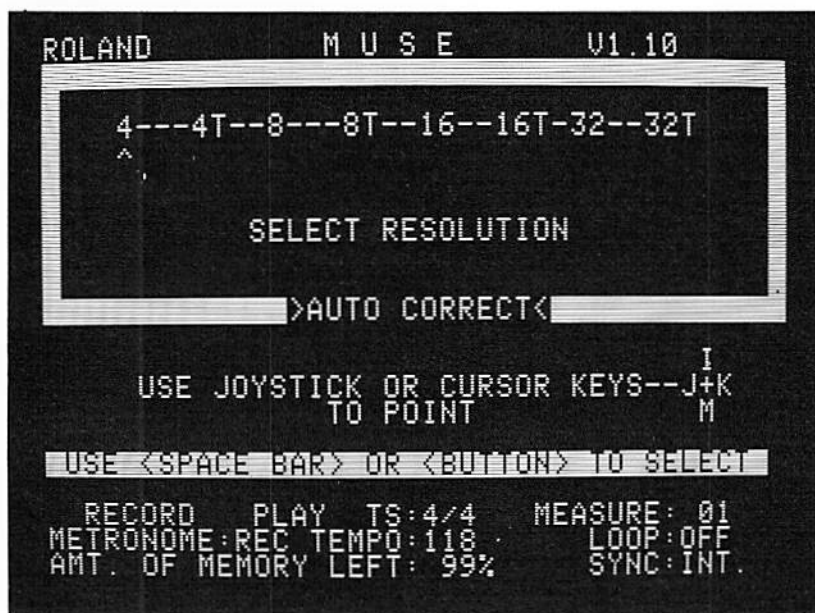
Some knowledge of the standard way music is measured using time signatures is helpful, but it isn't necessary to learn music theory in order to use MUSE.

AUTO-CORRECT

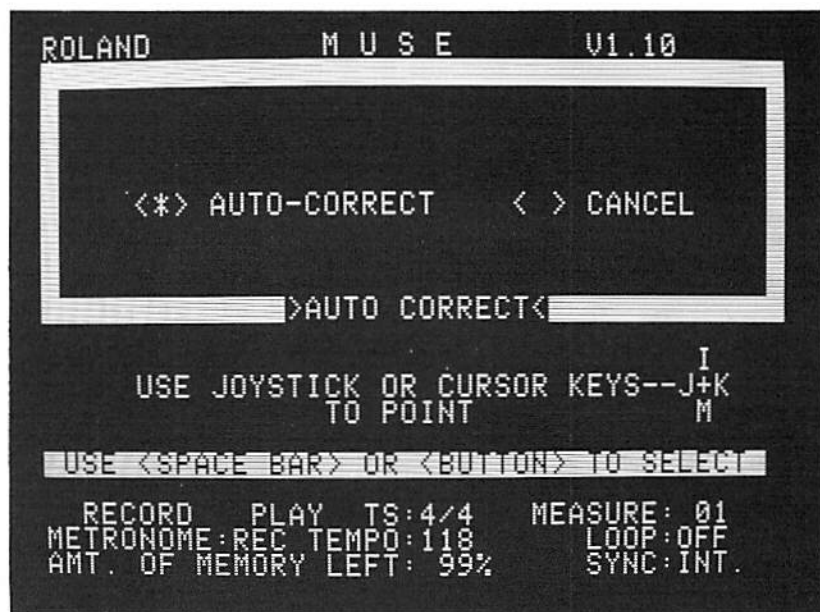
The AUTO-CORRECT function enables you to automatically correct any timing errors that occurred while the music was being recorded. It works only on tracks that have already been recorded with the metronome set to METRONOME:REC or METRONOME:ON (since this acts as a reference to the beat as you record).



When you select the AUTO-CORRECT function you are presented with the Auto-Correct Window. First point to the track you want auto-corrected then click the joystick button or space bar to select it. Next, a selection of



auto-correct resolutions will appear. You can choose to auto-correct tracks in resolutions that range from quarter note to thirty-second note triplet. Before auto-correction actually occurs you are given the option to cancel your selection, or allow MUSE to proceed with the auto-correct process.



MUSE corrects the timing of a selected track but leaves the articulation as it was played. This "phrase coherent" correction method ensures the timing accuracy of a track while retaining the music's expressiveness. Auto-correct has no effect on pitch bend, modulation wheel or other controllers so that may have been used in solos and lead lines.

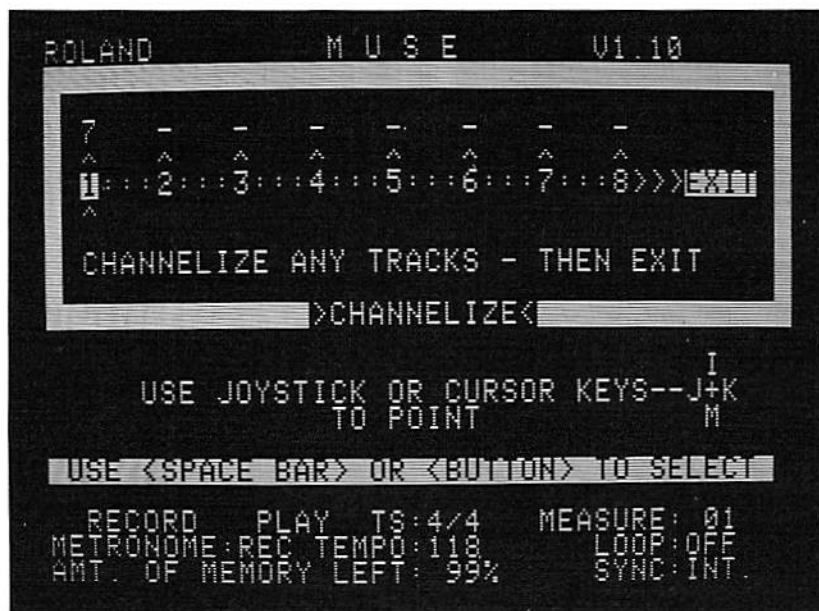
It is advisable to save music to disk or copy it to another track before auto-correcting it. This enables you to experiment with different resolutions before finalizing your selection, as it is not possible to undo an auto-correction. (See the section on the DISK function.)

CHANNELIZE

The CHANNELIZE function is very useful when working with multiple MIDI instruments. Each track recorded with MUSE can be assigned to any of sixteen standard MIDI channels. It is easiest to think of MIDI channels as being like the channels on your television set. An instrument with MIDI channel select can be set to receive any one of those sixteen channels. In this way it is possible to assign the playback of each track to a different MIDI instrument, or experiment with various other playback combinations. (Refer to the owner's manuals for the proper operation of specific MIDI instruments.)

When tracks are first recorded, MUSE also records the channel setting of the instrument you're using. When recorded tracks are played back, the channel assignment of each will correspond to the channel setting of the instrument on which it was originally played.

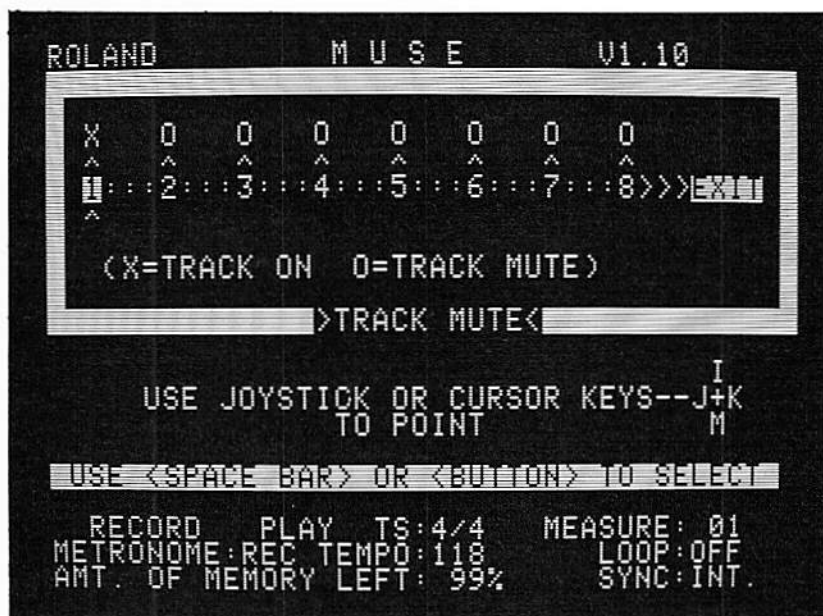
Selecting CHANNELIZE enables you to change the MIDI channel assignment of any track you've recorded. When you assign a track to a particular channel, any instrument set to receive that channel will play back the track assigned to it. Each track may be assigned to a different channel, or they all may be assigned to the same channel. MUSE also makes it possible to have several channel assignments on a single track. (See the section on the TRACK MERGE function.) Some care must be taken so that channel selectors on instruments are properly set to receive the tracks you have assigned them. Any changes in channel assignment will be saved to disk along with recorded sequences.



When the CHANNELIZE function is selected you will be presented with the Channelize Window. Above each track number is a dash (-). There is no on-screen indication of the current channel assignment of tracks. You must keep a written record of track channel assignments and any changes you make using the CHANNELIZE function. To change the channel assignment of a track, point to the track with the channel assignment you want to change, then click the joystick button or space bar. Each click will increment the channel assignment of the track by one. By holding the button or space bar down, you can move through the channel numbers quickly. If you go past the channel number you wanted merely keep going and it will recycle around. When you are finished reassigning channels, point to Exit and click the joystick button or space bar to return to the command screen. You may change one or all of the tracks' assignments each time the Channelize Window is opened by merely pointing to each of the tracks you wish to change.

The Channelize Window does not indicate the current channel of a track since it is possible to have several channels on each one. When the Channelize Window is closed, MUSE automatically sends an OMNI OFF/POLY message (see Glossary) over all MIDI channels. This message tells each synthesizer to play MIDI data only on the one channel it is set to. This MIDI message can also be sent by merely opening and closing the Channelize Window.

TRACK MUTE

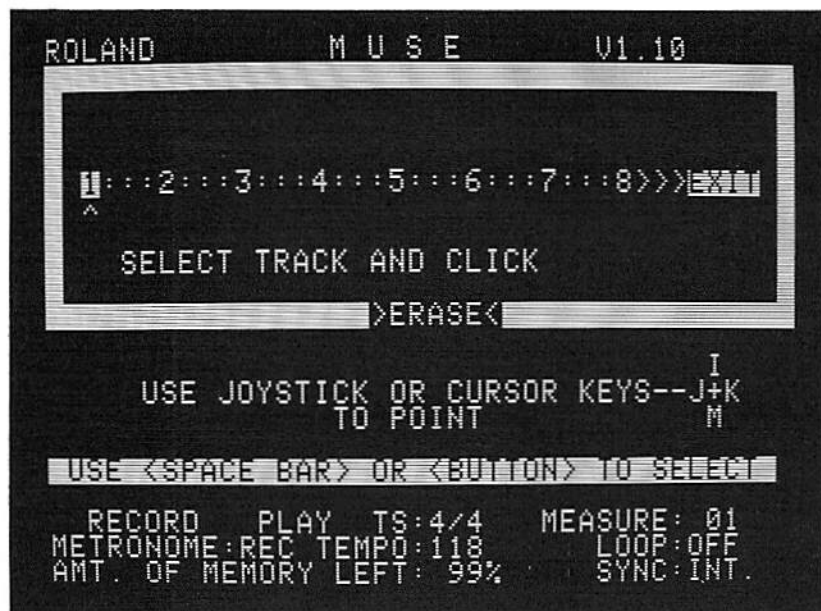


The TRACK MUTE function enables you to selectively turn tracks off, or mute them, during playback or while recording other tracks. This function works only on tracks that have already been recorded.

By selecting the TRACK MUTE function you will be presented with the Track Mute Window. First, point to the track you want to mute, then click the joystick button or

space bar. This toggles between two options: An "X" above a track number means that track will be audible; a "O" means that track is muted and will not be audible during playback or when recording other tracks. When you're finished muting tracks, point to Exit and click the joystick button or space bar to return to the command screen.

ERASE TRACK

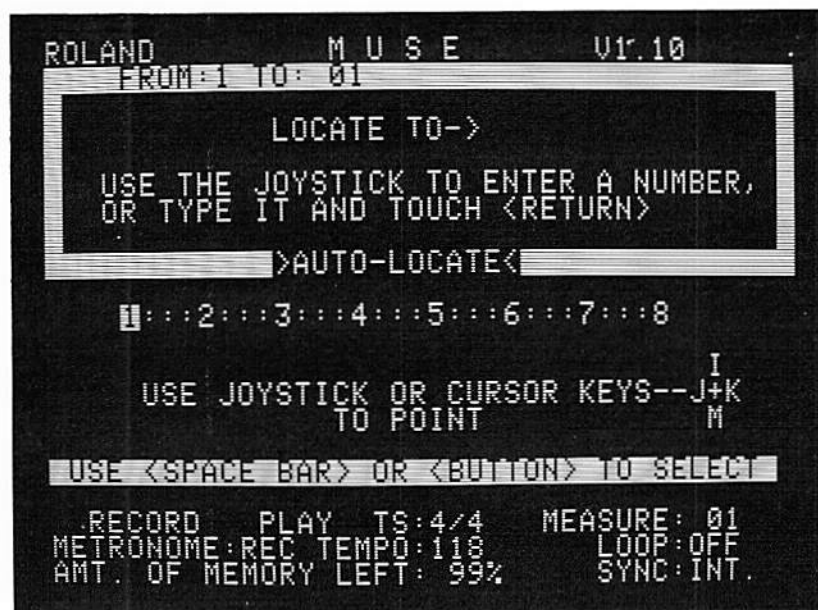


The ERASE TRACK function enables you to selectively erase individual tracks. This function works only on tracks that have already been recorded.

NOTE: Once tracks have been erased they cannot be recovered.

By selecting the ERASE TRACK function you will be presented with the Erase Window. First, point to the track you want to erase, then click the joystick button or space bar. This immediately erases the track you selected and you are directly returned to the command screen. If you enter this window by mistake you can return to the MUSE command screen by pointing to Exit and clicking.

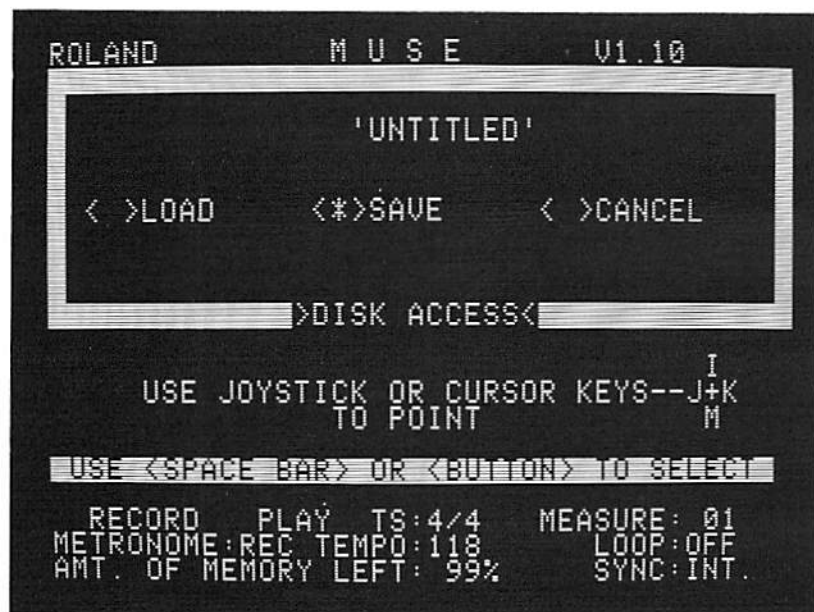
AUTO-LOCATE



The AUTO-LOCATE function enables you to listen back to music you've recorded starting at any measure (ranging from measure one to the longest unmuted track in memory). When you select AUTO-LOCATE you are presented with a window that will show you the range of measures you can select from (up to the the end of the longest unmuted track in memory) and it requests you to input a measure number. You may select a measure

number to start from by using the joystick or by typing it from the computer keyboard. All subsequent playback will be from this measure until you reset it back to measure one. If you select the LOOP function tracks will loop back to the auto-locate point you selected. The RECORD, AUTO-CORRECT, MERGE, and the COPY/EDIT, COPY/CHAIN functions will reset the auto-locator back to measure one. (See the section on each function for more on its operation.)

DISK



The DISK function enables you to Load in or Save to disk the music files you create with MUSE. When you select DISK, you are presented with the Disk Access Window. You can return to the command screen anytime from this window by selecting Cancel.

NOTE: It is not possible to copy the MUSE program disk. RolandCorp US will make known any program updates when they are released. (See MUSE License Agreement.)

To load a music file from the disk, point to Load in the Disk Access Window and select it by clicking with the joystick button or space bar. MUSE will then show you a list of the song files contained on the disk in drive 1. Load a music file by typing its file name, then press the Return key. If you change your mind, just press the Return key or click the joystick button instead of typing anything when asked for a file name. This will return you to the command screen.

To save music to disk as a music file, point to Save in the Disk Access Window and select it by clicking with the joystick button or space bar. MUSE will show you a list of the song files contained on the disk in drive 1. Save music by typing a file name for it up to eight letters long, then press the Return key. If you change your mind, just press the Return key instead of typing anything when asked for a file name. This will return you to the command screen.

NOTE: Be careful if you give the music you are saving a file name that is already contained on the disk: This will erase the previously saved music file and replace it with the current file of the same name. Each music file name is listed with a file-type indicator (.M). When loading or saving music files it is not necessary to type this indicator. Just type the file name.)

EXTRAS



EXTRAS opens the window to some of the most powerful features of MUSE. Some of these will be explored in more detail in the following sections of this manual. Here is an introduction to each selection found in the Extras Window:

AFTERTOUCH FILTER

Aftersustain is the control sent by pressing down on a synthesizer key after it has been initially struck. Aftersustain is typically used to control parameters such as vibrato or brightness. Some MIDI keyboards have aftersustain capability and some do not. MUSE can record aftersustain information from those MIDI keyboards that generate it, and when the music is played back it will be reproduced exactly if the receiving instrument also

responds to aftertouch. Aftertouch information can use up much of a computer's available memory, and often it is useful to have the option of filtering it out when recording. This conserves memory, resulting in greater note capacity for the piece you're recording.



To turn the Aftertouch Filter on or off, open the Extras Window, point to Aftertouch Filter and click with the joystick button or space bar before you start to record.

If this filter is OFF, MUSE will record all aftertouch information produced by the MIDI keyboard you use to record tracks.

If this filter is ON, MUSE will not record any aftertouch information from the MIDI keyboard you use to record.

The default position of the Aftertouch Filter is OFF, meaning that all aftertouch information played will be recorded by MUSE.

The Aftertouch Filter can also be used with COPY/CHAIN and COPY/EDIT. If you change your mind

after recording a track and wish to remove the aftertouch, this can be done by moving what you recorded to a new track (with COPY/CHAIN) and using the Aftertouch Filter to remove all aftertouch in the process.

PROGRAM CHANGE FILTER

Many MIDI keyboards allow you to change preset sounds at the touch of a button. For each different sound, a corresponding patch program is stored in your instrument's on-board memory. While recording tracks with MUSE you can manually change patch programs by selecting different presets, and when the music is played back those changes will be reproduced exactly.

To turn the Program Change Filter on or off, open the Extras Window, point to Program Change Filter and click with the joystick button or space bar before you start to record.

If this filter is OFF, MUSE will record all program change information produced by the MIDI keyboard you use to record tracks.

If this filter is ON, MUSE will not record any program change information from the MIDI keyboard you use to record.

The default position of the Program Change Filter is OFF, meaning that all program change information will be recorded by MUSE.

The Program Change Filter can also be used with COPY/CHAIN and COPY/EDIT. If you change your mind after recording a track and wish to remove the program changes, this can be done by moving what you recorded to a new track (with COPY/CHAIN) and using the Program Change Filter to remove all program changes in the process.

The Program Change Filter can be especially useful to remove program changes from sequences you transfer to MUSE from another sequencer, such as the MSQ-700. (See the section on Advanced Applications.)

MODULATION WHEEL FILTER

Many MIDI keyboards are equipped with a modulation wheel or other such device that allows you to modulate a sound while you're playing. (See the owner's manual of the MIDI instrument you are using for more information on the use of the modulation wheel.) MUSE can record modulation wheel information from those MIDI keyboards that produce it, but this too can use up much of the computer's available memory. The Modulation Wheel Filter gives you the option of filtering it out when recording.

To turn the Modulation Wheel Filter on or off, open the Extras Window, point to Mod Wheel Filter and click with the joystick button or space bar before you start to record.

If this filter is OFF, MUSE will record all modulation wheel information output from the MIDI keyboard you use to record tracks.

If this filter is ON, MUSE will not record any modulation wheel information from the MIDI keyboard you use to record.

The default position of the Modulation Wheel Filter is OFF, meaning that all modulation wheel information played will be recorded by MUSE.

The Modulation Wheel Filter can also be used with COPY/CHAIN and COPY/EDIT. If you change your mind after recording a track and wish to remove the modulation wheel effects, this can be done by moving what you've recorded to a new track (with COPY/CHAIN) and using the Modulation Wheel Filter to remove all modulation wheel effects in the process.

LOOP



Selecting LOOP in the Extras Window enables you to loop the playback of music in two ways: Song Loop and Track Loop.

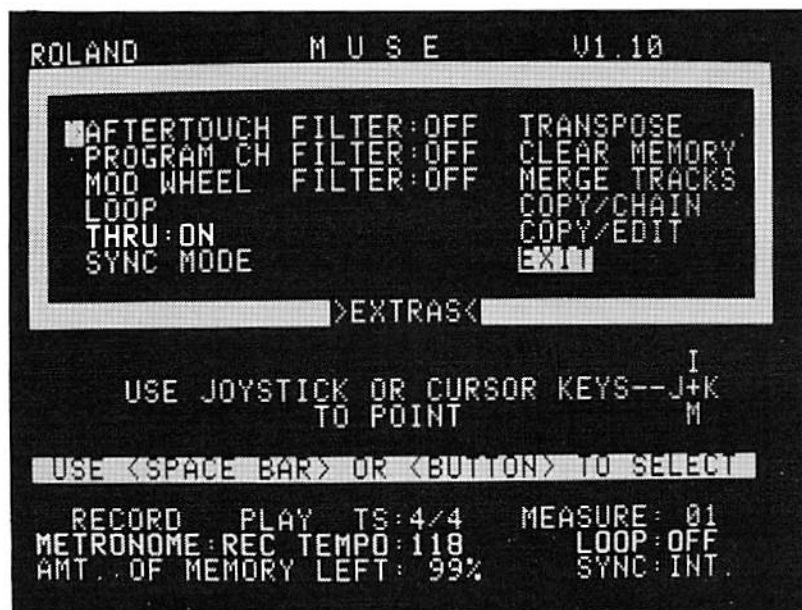
Song Loop will continuously repeat the playback of a piece of music from its beginning to the end of the longest unmuted (or audible) track. If there are tracks of various lengths, the shorter ones will wait until the longest ones are finished playing before restarting. If you have selected an auto-locate point within a piece from which to playback from, Song Loop will continuously loop the playback from that auto-locate point to the end of the longest unmuted track.

Track Loop also repeats all unmuted tracks indefinitely, but each track individually loops its own length. In Track Loop mode the shorter tracks do not wait for the

longer ones before restarting; there are no gaps in the music upon playback.

To stop playback in Loop Mode, click the joystick button or press the space bar.

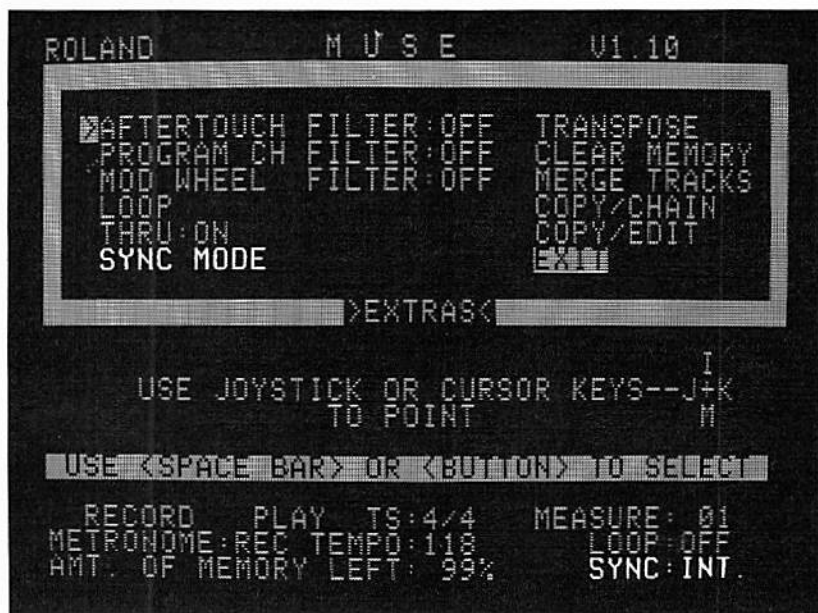
THRU



With THRU:ON (the default setting), any MIDI data coming into the MIDI In jack of the MPU-401 will pass directly to MIDI Out. While MUSE is playing tracks, the MIDI data being played is mixed with any incoming data from other MIDI instruments and the combined information is sent to the MIDI Out jack of the MPU-401. To turn Thru off, open the Extras Window, point to THRU, and select it with the joystick button or space bar. THRU:OFF is useful for those times you may not wish to hear a "slaved" synthesizer while programming a sound on a "master" keyboard.

SYNC MODE

Sync Mode enables you to select the type of synchronization MUSE uses to determine the starting and stopping and the record or playback tempo of music. There are three sync modes available in MUSE: INTERNAL, MIDI, or TAPE sync.



1. INTERNAL sync is the standard (or default) mode when you first load MUSE. In this mode MUSE uses its internal clock to determine the recording and playback tempo of music with a resolution of 120 clock cycles per quarter note.

2. MIDI SYNC enables you to use an external MIDI-based clock to synchronize the record and playback tempo of music. The clock rate for MIDI sync is 24 clock cycles per quarter note. (When using MIDI sync MUSE internally multiplies this rate to its high speed clock to ensure no loss in resolution.) A MIDI device, such as another MPU-401, a Roland MSQ-700, or any other

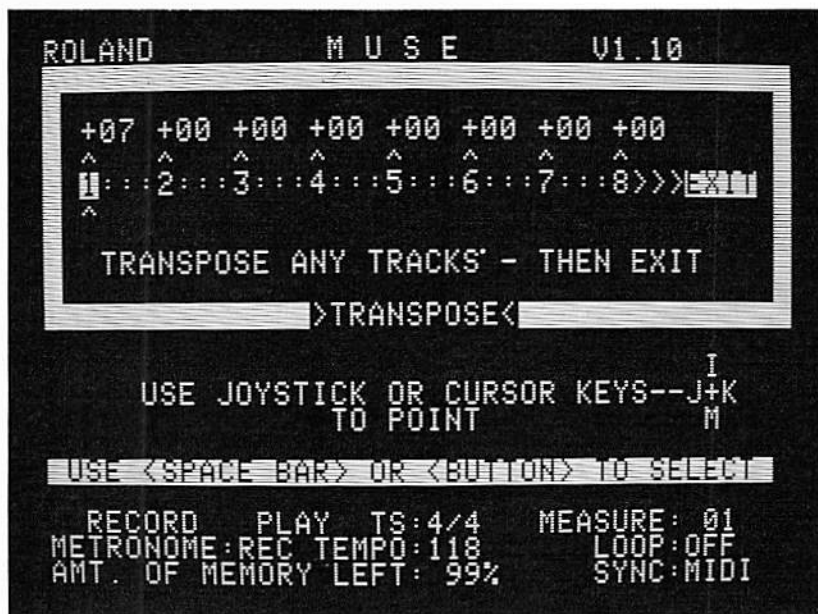
device that generates MIDI clock signals, is needed to use this type of synchronization. No extra cabling to the computer is needed to use MIDI sync because all timing information is transmitted across the MIDI bus (see MIDI in the Glossary). All that is required is a MIDI connecting cable from the MIDI Out jack on the synchronizing device (the "master" unit) to the MIDI In jack on the MPU-401 (the "slaved" unit). In MIDI sync mode this cabling permits record and playback to begin when you select them by sending a MIDI Start signal to the MPU-401 from the "master" unit.

3. TAPE SYNC enables you to use an external audio clock signal, known as FSK (Frequency Shift Key), that can be recorded on tape to synchronize the recording and playback tempo of MUSE. This makes it possible to record multiple tracks on a tape recorder with each track perfectly synchronized to all others. MUSE both generates and reads FSK sync tones. The resolution of Tape Sync in MUSE is also 24 clock cycles per quarter note.

To change sync mode open the Extras Window, point to SYNC MODE and click with the joystick button or space bar. The type of synchronization selected is shown in the lower right-hand corner of the command screen. See the sections on Tape Synchronization and Advanced Applications in this manual for more details on how to use the various sync modes.

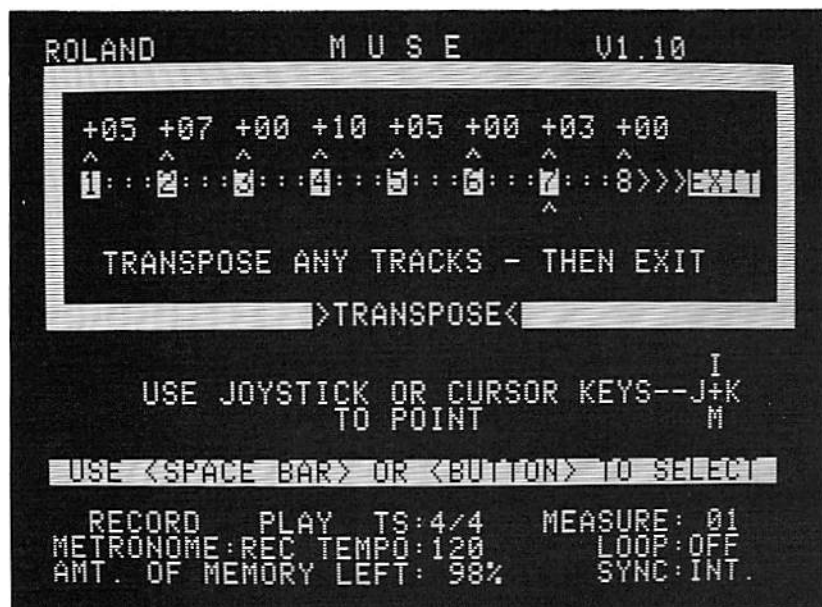
TRANPOSE

Individual tracks can be transposed up or down the scale by selecting TRANPOSE in the Extras Window. Tracks may be transposed up or down the scale up to twelve half-steps at one time. To transpose tracks further, select TRANPOSE again and continue to transpose any tracks until they are correct.



To transpose recorded tracks, open the Extras Window, point to TRANPOSE and click with the joystick button or space bar. You will be presented with the Transpose Window. Point to the track you want to transpose, then click the joystick button or space bar to transpose that track a half-step at a time. Over each track number is an indication of the number of half-steps that track is being transposed, ranging from -12 to +12 half-steps. Leaving a track set to +00 means that you have not transposed it. TRANPOSE actually changes data in memory, so tracks transposed to a new key will be recalled in that key after they have been saved. When

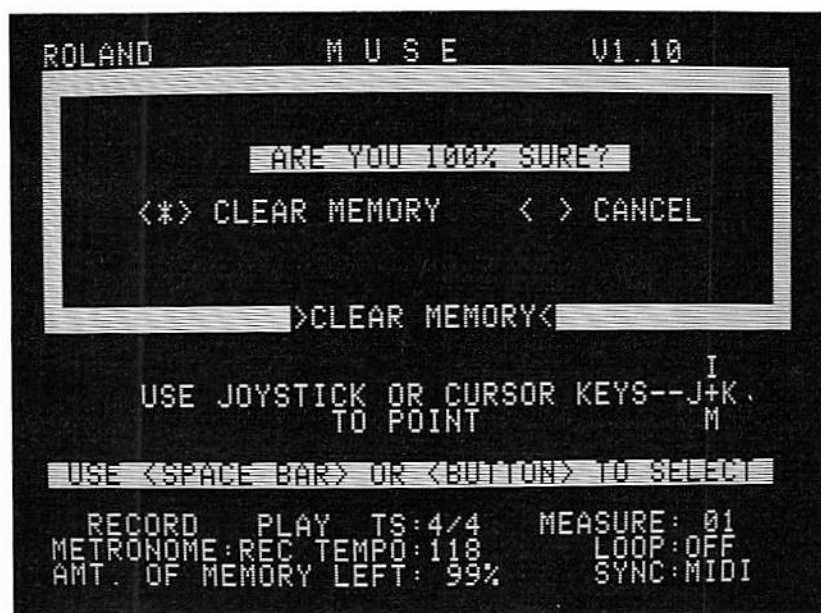
you transpose a track, the changes in pitch you choose-- up or down the scale-- are relative to that track's current location on the scale.



MIDI has a set range of allowable pitches. If you transpose a particularly high part and it goes beyond the MIDI range, MUSE will do the transpose and then drop those notes an octave back into the acceptable MIDI range. This way a chord may get inverted but the new key will be established. This is also true for low parts that are transposed below the lowest MIDI range.

When you're finished transposing tracks, point to Exit and click the joystick button or space bar to return to the command screen.

CLEAR MEMORY

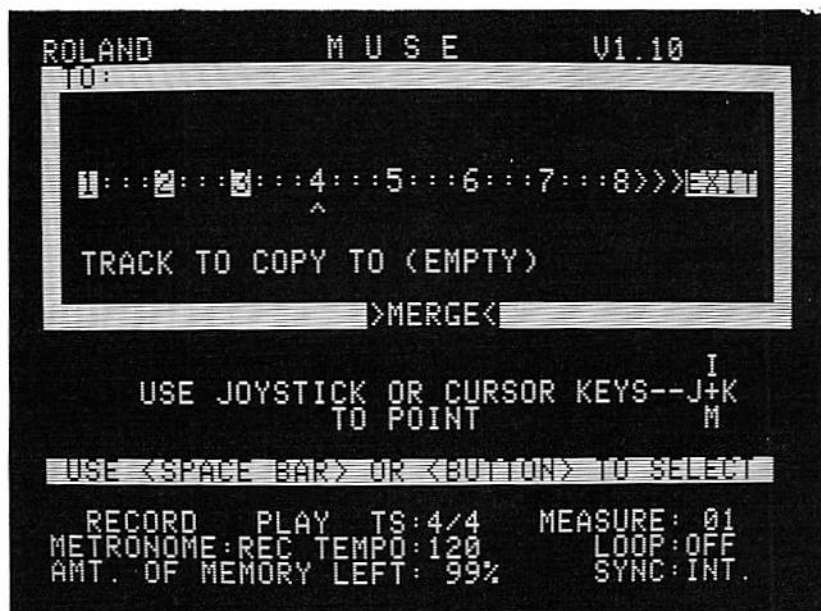


Two kinds of memory reside in the computer, the ROM and the RAM. The ROM, or Read Only Memory, is activated when the computer is turned on and contains data that cannot be erased or changed. The RAM, or Random Access Memory, contains transient data that can be changed, loaded into the computer from a disk, or erased irretrievably.

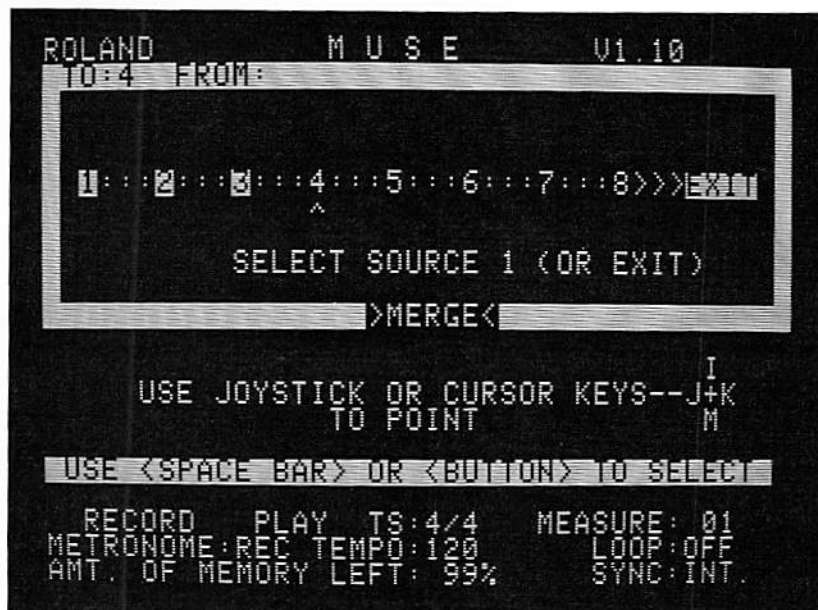
Selecting CLEAR MEMORY in the Extras Window enables you to erase all the MIDI data currently residing in the computer's RAM irretrievably. Before it does this, however, you are given a second chance to decide if you really want to erase this musical data. In this way MUSE enables you to save on disk MIDI data that you may have forgotten to save before selecting CLEAR MEMORY.

MERGE TRACKS

Selecting MERGE TRACKS in the Extras Window enables you to merge two recorded tracks together onto a single empty track, thus creating a new track that combines all the musical data of the two individual tracks. The process of merging tracks will not erase the original tracks being merged. To erase any tracks, you must select ERASE TRACK from the command screen.

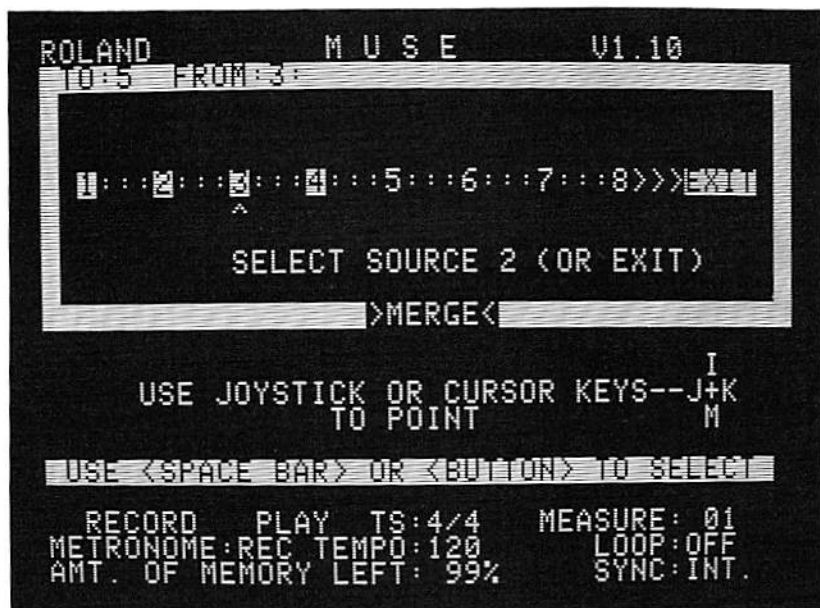


To merge recorded tracks, open the Extras Window and select MERGE TRACKS. You will be presented with the Merge Window. First you must choose an empty track on which to combine the previously recorded tracks you want to merge. To do this point to the track number of an empty track and click with the joystick button or space bar. The track you are merging to will be indicated in the upper left corner of the Merge Window.



Next you will choose which two recorded tracks you want to merge together. The tracks you are merging together will also be indicated in the upper left corner of the Merge Window. Start by pointing to one of the tracks to be merged (Source 1) and click with the joystick button or space bar to select it. Next point to the other track you are merging (Source 2), and select it also by clicking. Immediately the two tracks will be merged as selected to the new track and you will be returned to the Extras Window.

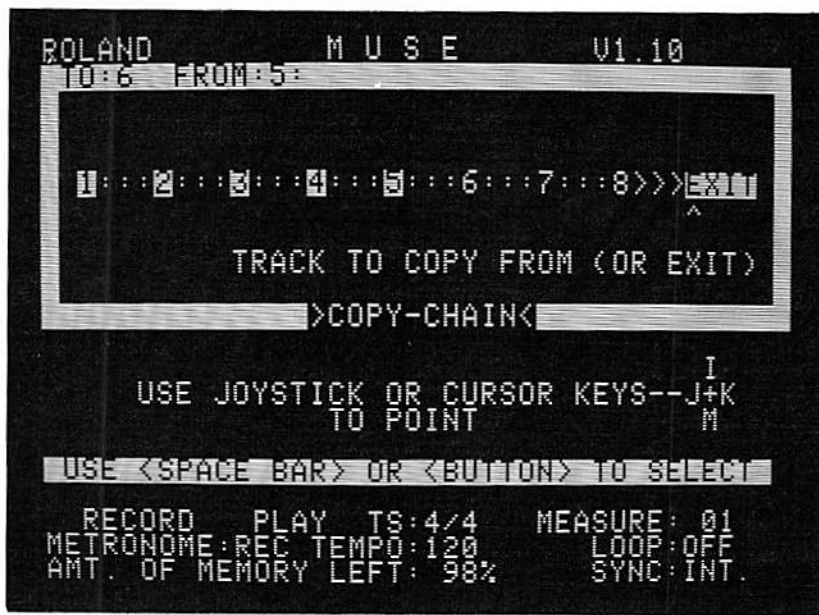
You may merge as many recorded tracks as needed, two at a time, as long as there are empty tracks available to contain the new merged tracks. It is possible to merge tracks that have resulted from a previous merge. A new track created by merging tracks will retain the independant MIDI channel information for all sixteen MIDI channels contained in the original tracks.



COPY/CHAIN

Selecting COPY/CHAIN in the Extras Window enables you to copy as many recorded tracks as you like and chain them together, end to end, in any order, onto a single empty track. This process will not erase the original tracks being copied and chained. To erase any tracks, you must select ERASE TRACK from the command screen.

To copy/chain recorded tracks, open the Extras Window and select COPY/CHAIN. You will be presented with the Copy/Chain Window. First you must choose an empty track on which to combine the previously recorded tracks to copy and chain. To do this, point to the track number of an empty track and click with the joystick button or space bar. The track you are copying to will be indicated in the upper left corner of the Copy/Chain Window.



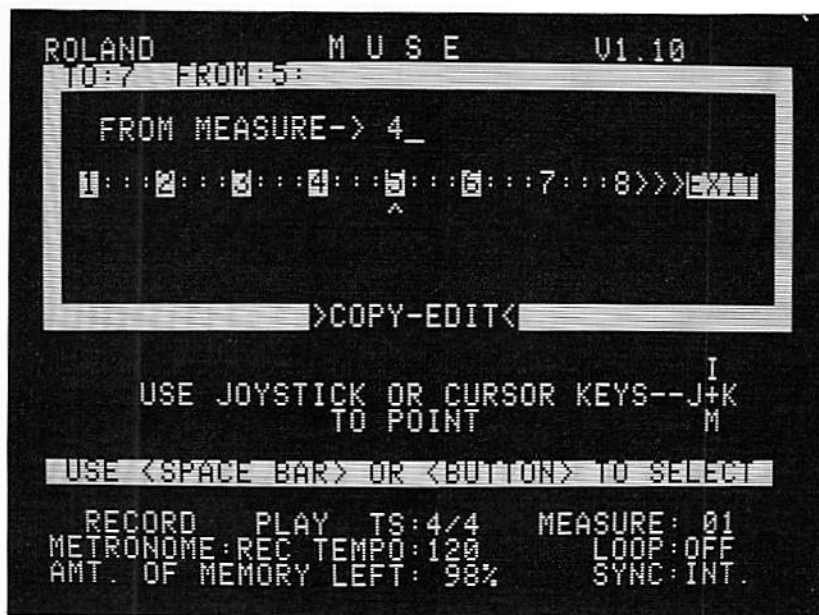
Next choose the recorded track you want to copy and chain first. You may select as many different tracks as you want to copy/chain. These tracks will also be indicated in the upper left corner of the Copy/Chain Window, in the order in which they are being chained. When you are finished selecting the tracks you want to copy/chain, point to EXIT and click the joystick button or the space bar to return to the command screen.

Every time you select a track to copy chain, an exact duplicate is placed at the end of the new track. Keep in mind that while this allows you to use your tracks like patterns of a drum machine it will use up memory as it goes along.

COPY/EDIT

Selecting COPY/EDIT in the Extras Window enables you to copy as many recorded tracks as you like and chain them together, end to end, in any order, onto a single empty track. This selection differs from Copy/Chain in that you may also extract portions of tracks to be chained together. Editing can be done on a bar by bar basis. This process will not erase the original tracks being copied. To erase any tracks, select ERASE TRACK from the command screen.

To copy/edit recorded tracks, open the Extras Window and select COPY/EDIT. You will be presented with the Copy/Edit Window. First you must choose an empty track on which to combine the previously recorded tracks you want to copy and edit. To do this point to the track number of an empty track and click with the joystick button or space bar. The track you are copying to will be indicated in the upper left corner of the Copy/Edit Window.



Next choose which recorded tracks you want to copy and edit first. These tracks will also be indicated in the upper left corner of the Copy/Edit Window in the order in which they are being chained. You are then prompted for the first and last measure number you want of the track you are copying. These numbers can be entered either by the joystick or typing on the computer keyboard. MUSE extracts just these measures from the track you are chaining and places them at the end of the new track. You may then select more measures from the same track or from any other recorded track. When you are finished selecting the tracks you want to copy/edit, point to EXIT and click the joystick button or the space bar to return to the command screen.

MIDI is made up of NOTE ON messages when a key is pressed and NOTE OFF messages when that key is released. There may be times when the NOTE OFF message to shut off a particular key may be in a different measure than the NOTE ON. Be careful in using COPY/EDIT that these don't get separated. It is

recommended to auto-correct tracks before editing them if it appropriate. If a NOTE OFF does get edited out it can be regenerated by holding the note down and recording just the release onto a track, and then MERGING it with the problem track.

EXIT

Pointing and clicking on EXIT will take you out of EXTRAS and back to the command screen.

A USER'S MUSINGS

When I first sit down to work out my musical ideas, to develop the rough ideas and fragments into a complete composition or song, all my concentration is focused in that creative process. The only thing I want to be concerned with is that material. MUSE provides me the freedom to do just that. As a composer's tool it's almost transparent. I can play with musical ideas, watch them grow, then organize them into structures that express what I feel and that I can call complete. And you don't have to be a genius to use it. No computer background at all is required. Anybody can learn how to use MUSE in just a few minutes.

If you look at what's going on today in the world of contemporary pop music-- the kind you hear on the radio-- you'll find that although a lot of songs possess a certain repetitious quality, the music is clearly divided into sections. MUSE is set up in a way that's very attractive to songwriters because it allows you to segment each part of a composition and have control over each one individually in terms of editing and arranging. Most contemporary song writers like to work this way. For example, you might write a hook, or you've got an idea for the verse or the chorus, or you've got the fade worked out but you don't really know the order to put them in. MUSE gives you the creative freedom to develop individual parts to the fullest and then experiment with fitting them together until you're satisfied with the transitions and order. This freedom applies not only to these structural manipulations of a piece of music, but also extends to developing arrangements. With MIDI channel assignment you can try out any sound with any part until it feels right.

There's also another kind of freedom I find MUSE gives a creative artist: It allows you to stretch your playing technique. Creative people who have musical ideas to express but only marginal or even questionable playing technique can transcend those limitations with MUSE. Look at what can be achieved, for example, using the Auto-Correct, Track Merge, and Tempo features. Say you can't get the timing right on a part you're trying to record. Slow the tempo down and record it at a tempo

you can handle. Then play it back at the correct tempo; the pitches will be the same as you played them. Or use the Auto Correct feature to correct any timing discrepancies. And if a part you have in mind is too complex for you to play, first break it down to its more simple components and record them on individual tracks, then bring them all back together in beautiful complexity using Track Merge. You can even use Auto-Locate to find particular measures and re-record them by punching in.

A typical MUSE recording session might go something like this: Let's say I'm starting out with a very unclear idea of what I want to do. I call this a creativity session. After making all the proper MIDI connections between the MPU-401 and my keyboard I'm ready to record something. I like to play along with a rhythm machine, so first I find a tempo I'd like to work with for now-- I can always change that later. Then I go straight to Record, choose a track, and start playing. (In a creativity session I bypass Setup when recording because I like to stop whenever I feel like it by just clicking the joystick button.) When I'm finished recording I listen back to what I played and I do one of three things: Either I throw it all away because I don't like it, or I save it to disk because I think there might be something there, or I do an overdub and continue to build on it, saving what I like to disk as I go.

Let's say I've decided to try an overdub, selecting another track to record on. I will still bypass Setup at this point because I want to leave things open. (Since this is a creativity session I don't want anything to pin me in.) As I record the overdub on a new track while playing along with what I recorded before, I feel like I'm finally in a groove, so even after the previous track has finished I continue to record what I'm playing in order to capture my spontaneity. When I'm satisfied I stop and listen back to what was recorded. Here's when I might start operating on those tracks using MUSE's editing features to delete the measures I don't like, merge the ones I do like onto a single track, and auto-correct tracks for any timing mistakes in my playing. (I don't usually auto-correct tracks if I want to retain the personal feel to my playing-- mistakes and all.) It's at this point that a song starts taking shape out of the various parts I've recorded, so I start to

structure things a little more, saving everything to disk as I go along.

That's the way things might go in a creativity session with MUSE. If I'm beyond the experimental stage and I'm working on a composition or song that has already been written, with predetermined sections and length, things go a little differently.

Before I even sit down with MUSE I have the entire piece I want to record organized on a sheet of paper listing each section of the composition, their lengths in measures and their order, as well as any arrangement ideas. (If it's a pop song we're talking about verses, choruses, bridges, vamps, etc.) The first thing I do before I record is decide on the right tempo and time signature for the piece. I usually have my rhythm machine connected to help with this and to capture the proper feel I want. Next I select Record from the command screen, choose a track on which to start recording the first section of the piece, and then before beginning I select Set-Up. Set-Up allows me to select the exact number of measures I want to record for this first section of my piece. (Remember, I figured all this out on paper before I even got started.) As I'm recording, when the number of measures I selected is reached MUSE will automatically stop the recording process.

Let's look at a typical example of how this process works. Say I want to start by recording Section One of a song, which lasts eight bars. After setting the tempo and time signature I first select Record from the command screen, choose a track, and then use Set-Up to input the number 8 because this section is eight bars long. Then I select Record to actually begin. First the two lead-in measures pass (I can count along with them by listening to the Metronome, which is set to METRONOME:REC), then the actual recording begins on the first bar of this section. Since I have my rhythm machine hooked up too, it kicks in on this first bar. I record the bass part for eight bars, and at the end MUSE automatically stops the recording. At this point I listen back, and re-record or auto-correct if I'm not satisfied with the way I played the part.

Next-- still working on the eight-bar Section One-- I move on to another track to record a chord progression. Previously I only had the metronome and rhythm machine to listen to while recording; now I will also have the bass part to play along with. (If I'm working with another MIDI synthesizer I can use Channelize to have it play back the bass part.) Once again I select Record from the command screen, choose a new track to record on, and then begin recording. When I'm satisfied with that track, I move on to new tracks to similarly record other overdubs. I will record all the overdubs I want for this eight-bar section before going on to record any tracks for other sections in the song. In this way I can work on each section in its entirety and hear it in its completed form before moving on to concentrate on other sections.

As a rule of thumb, before I've filled up all eight tracks with the overdubs for a section, I merge them all together onto a single track. But even before I do this, I always save the song to disk as an individual file that contains all the overdubs still separated on their respective tracks. In other words, for each song I always save multiple back-up files: One file for each section of a song in which the overdubs remain separated on their individual tracks, and one file in which the overdubs have been merged together onto a single track. Then, after I've recorded all the sections of a song, with all the overdubs saved and merged, I use Copy/Chain to string the merged tracks together in their correct order to create a master file for the song, which I also save. As you will find, it's important to keep good written records of what you're doing as you go along (see the Track Sheet provided at the end of this manual) and in addition, to keep your song files on disk well organized. I've found it's helpful to always save the song files of unmerged tracks on a different disk than the one containing the song files of merged tracks.

Now let's move on to the section on Advanced Applications to take a closer look at some of the other MUSE functions that come in handy once tracks have been recorded.

ADVANCED APPLICATIONS

Auto-Correct. Depending upon the style of your music you will have different concerns about the feel of what you've recorded, its particular articulation. It is these considerations that should determine how you use auto-correct. If you strive to record a piece of music in a certain style and it doesn't quite project the feel of that style, you can either accept it as is, or try re-recording it, or try to salvage it using auto-correct. The auto-correct resolution you choose should be based on feel. For example, if the music has a triplet feel you should take that into consideration and choose an auto-correct resolution (such as sixteenth-note triplet) that will enhance it. Also, try to choose a resolution that can accomodate the shortest note played. In other words, if you auto-correct a piece containing sixteenth or thirty-second notes to the eighth-note resolution, some of those notes may be transformed after auto-correction into eighth notes. It is often wise to auto-correct to a shorter note resolution to be safe. For example, if a track consists entirely of eighth notes it may be best to auto-correct it to the sixteenth note resolution.

The great thing about MUSE's Auto-Correct is that it doesn't affect the expression you've recorded using devices like the pitch bend, aftertouch, mod wheel, or any foot pedals. It enables you to clean up only the rhythms of what you've recorded, and since the articulation itself is unaffected, much of the feel in your playing remains after an auto-correction.

Anytime you auto-correct it's advisable to save the uncorrected version first, or copy it to another track, in case the auto-corrected version is unsatisfactory. Be sure to listen to a track all the way through before auto-correcting it. A track may be acceptable as is, and would suffer from auto-correction.

Channelize. You use Channelize to change the channel assignments of tracks after they've been recorded. You should keep a written record of the original and current channel assignment of each track in your song files (use the Track Sheet at the end of this manual). There is no indication on the screen of a

track's channel assignment since tracks may contain more than a single MIDI channel assignment. A track's initial channel assignment is determined when it is recorded by the channel setting on the instrument used to record it. A track that's been recorded using a MIDI instrument set to channel eight will be assigned to MIDI channel eight until you change it with the Channelize function.

You can use Channelize in a couple of different ways. Say you're recording tracks with a MIDI synthesizer that can only transmit MIDI data on Channel 1 (like the Yamaha DX-7). Those tracks would all be assigned to Channel 1. If you want them played back on another synthesizer set to a different channel, you can use Channelize to change those channel assignments. Or, if you're working in a situation with multiple MIDI synthesizers connected together and each set to a different patch and channel assignment, you can experiment with different arrangements by reassigning tracks to the various synthesizers until you find the right sound for each track. This is a fast way to experiment with getting the right sound for particular musical phrases without having to switch MIDI connection cables between instruments.

Tracks that have been created by merging other tracks having different channel assignments will contain more than one channel assignment. You can use Channelize to reassign such tracks to a single MIDI channel (for reference purposes), but the different channel assignments for each of the parts will be lost (unless you've saved those individual tracks to disk as a separate file before merging them). If the individual tracks have not been saved, it is possible to retrieve the individual parts assigned to particular channels from a merged track. To do this you need a Roland MSQ-100 Digital Keyboard Recorder: First record the merged track from MUSE into the MSQ-100 (see the section on MIDI Sync), then use the MSQ-100 to erase all channels except the channel assigned to the part you want to extract. Finally, record the remaining channel back to a separate track of MUSE. Repeat this process for each channel/part you want to extract.

Punching in using Copy/Edit. When listening back to a track you may decide that a few measures with the track are not quite right and should be replaced. Punching in those measures is easy using Copy/Edit.

Let's say you've recorded measures 1 through 8 on track one, and measures 5 and 6 should be replaced. Here are the steps to do this: First record a second track consisting of two measures of rest (corresponding to the two measures you want to replace). Next open the Extras Window and select Copy/Edit. When you're asked for a track to copy to, choose an empty one, in this case track three. When asked for a track to copy from, type 1 for track one, then you will be asked for the measures you wish to copy. In this case you would type measures 1 through 4 (the first measures of the track). When asked for the next track to copy from, type track two, measures 1 and 2 (the two measures of rest), and for the next track to copy from type track one, measures 7 and 8 (the remaining measures in track one). Point to Exit and click to return to the command screen. With Copy/Edit you have just created a new track three that is exactly like track one except that measures 5 and 6 (the ones you wanted to replace) are rests. If this track is satisfactory, you can erase the original track (track one) and the track with the rests (track two) at this time. This process usually takes only a few seconds.

Now you can punch in two new measures to replace measures 5 and 6 of rest: Select Record from the MUSE command screen, choose an empty track to record on (in this case track four) and select Set-Up. When asked which measure to begin recording from choose measure 5; when asked how many measures to record choose 2. You are now ready to record your punch-in as measures 5 and 6 on the empty track four. MUSE will automatically "roll back" two measures before the punch-in point to begin playback. Recording will begin on the measure you selected (measure 5) and continue for the duration you selected (2 measures), automatically stopping after measure 6, in this case. You can then select Play to listen back to what you recorded. (NOTE: Until you do another Set Up, Play and Record will automatically begin two measures before the punch-in point you selected.) If the punch was not good, just erase it and select Record again. You can record the punch

again without having to do another Set Up, re-recording it as many times as you'd like until it is satisfactory. The final step is to open the Extras Window, select Merge Tracks, and merge track three with track four to an empty track (in this case track five). This new track now contains the measures that were punched in plus the measures from the initial track (minus the unwanted measures). If you're satisfied with your new track you can now erase any of the other tracks that went into creating it if you haven't already done so.

Editing with Copy/Chain. To better understand how Copy/Chain works, let's look at the same problem and solve it using Copy/Chain this time.

Track one consists of measures 1 through 8, and you want to replace measures 5 and 6. First use Copy/Edit to create two new tracks: track two, consisting of measures 1 through 4 from track one; and track three, consisting of measures 7 and 8 from track one. Now select Record, and choose track four (or any empty track) to record on, and record the two measures you want to punch in at the beginning. (You might want to mute the other tracks when recording this one.) Finally, use Copy/Chain to chain tracks two, three, and four together consecutively on track five. Track five now contains the measures from the initial track with new measures replacing the unwanted measures. Listen back to track five using Track Mute to mute tracks one through four. If you're satisfied with it, you can proceed to erase the other tracks.

Using Copy/Chain to edit in this way becomes a fast process once you've done it a couple of times. The basic idea is simple: You can think of the tracks the same way you think of patterns in a drum machine, using Copy/Chain to link them end-to-end on an empty track. You can develop an entire song this way from the beginning, or simply use Copy/Chain as a tool for replacing unwanted measures in recorded tracks.

Track Merge. A good approach to composing any piece of music is to do it in small sections. We've already looked at how to do this with Copy/Edit and Copy/Chain, but it's also possible to do this using Track Merge. Instead of worrying about getting

through the entire composition in one pass, you can record smaller sections one at a time, each one starting at the end of the last one. To do this, choose Record and select Set Up to record only the first section of the piece. Let's say you've recorded thirty-two measures and you're ready to record the next eight. Choose Record for an empty track and select Set Up again, this time start at measure 33 and record for 8 measures. First MUSE will "roll back" to measure 31 and begin playing, then you actually begin recording at measure 33 (after the end of what had been recorded previously). If both tracks are satisfactory, use Track Merge to merge them together on an empty track and erase the original tracks. (You could also erase what you just recorded if you don't like it and re-record it without having to select Set Up again.) This technique of recording new tracks of additional measures at the end of the measures you've already recorded and then merging them can continue indefinitely until the composition is completed.

With Track Merge it is possible to merge only two tracks at one time, however, after a merge is completed you are returned directly to the Extras Window so you can immediately continue to merge more tracks if you wish.

Auto-Locate. This feature comes in handy when you want to locate particular measures to fix or change, or to listen to repeated playbacks of a particular section of music without having to listen back to the entire piece.

Loop. Song Loop is used to continuously repeat the playback of a piece of music. This is useful if you want to experiment with new parts, practice a part, or improvise continuously while listening back to recorded tracks. In Song Loop, if there are tracks of different lengths, the shorter ones will wait until the longest one is finished before they loop back.

Track Loop mode is similar except that each track will loop for its individual length. If you have a two-measure bass line on one track and a four-measure rhythm part on another, Track Loop enables you to listen back to both tracks continuously (with no gaps). Track Loop can also be used for looping particular tracks that you may want to practice along with while muting

others. Track Loop can be used to create some interesting compositional effects by looping tracks of different lengths (such as a track of 8 measures against one of 5 measures). If you're composing a track in this way and want to record it, chain the tracks you were looping to create full tracks. (Loop will not operate while recording tracks.)

Thru. With THRU:ON (the default setting), MUSE allows any MIDI data going into the MIDI In jack of the MPU-401 to pass through to the MIDI Out jack. This is important because it enables you to hear any other MIDI instruments that are connected to the MPU-401. These incoming MIDI signals will then be mixed with what MUSE is playing and be audible.

Let's say you have a MIDI keyboard going to the MIDI In jack of the MPU-401 that you are using as a "master" keyboard and that it is controlling one or two other MIDI instruments connected to the MIDI Out of the MPU-401. Anything you play on the "master" keyboard will be played by all the other MIDI instruments set to the same MIDI channel. If you are working on a new patch, or if you are listening to different preset patches to find a sound, you may not want the other MIDI instruments to respond to those changes. By turning Thru off, MIDI In and MIDI Out on the MPU-401 are disconnected. This enables you to do your work on the "master" keyboard without affecting the other MIDI instruments. When you're finished you can turn Thru on again. (This offers a better alternative than having to turn down the volume on all the other MIDI instruments or having to change their MIDI channel settings if they are adjusted to your liking.)

Transpose. You can transpose individual tracks to hear different interval relationships between parts you have recorded. Transposing a track up an octave may put a part into a better range for a particular synthesizer patch. You can also transpose all the tracks up or down to put the entire piece into a new key (say, to accommodate a singer's range).

By using Transpose along with Copy/Edit and Copy/Chain you can extract, transpose, and replace individual measures or sections of a piece of music. This makes it possible to rework a chord progression or even a melody without re-recording. Let's

say you're working on a song with a chord progression of C-D-G. After listening back to it you decide to change the D chord to an F chord. To do this first remove the measures containing the D chord with Copy/Edit to an empty track. Then transpose them up three half-steps to F. (Remember, you haven't done anything to the original track yet.) Now use Copy/Edit again to reassemble the original tracks, but replace the D-chord measures with the transposed F-chord measures. In this way you've created a new chord pattern in a matter of seconds. If you don't like how it turned out you can erase it because you still have the original track you started out with. If the new track is satisfactory erase the original track as well as the track containing the transposed chord.

If the music you are working on contains continuously repeating patterns, you can create just one pattern, make copies of it to other tracks (with Copy/Chain), transpose the various tracks as you like, then use Copy/Chain to build a track with the chord progression you want. (Besides being used in this way with Transpose, this same approach to modifying a piece using Copy/Chain could also apply to applications of Auto-Correct and Channelize.)

Internal and MIDI Sync Mode Applications. MUSE can be used with other sequencers and rhythm machines as either a "master" (the controlling device) or as a "slave" (the controlled device). When set to Internal Sync (the default setting when MUSE is first loaded), MUSE can act as a "master" by connecting the MIDI Out jack of the MPU-401 to the MIDI In jack on clock-based instruments to be controlled, such as other sequencers or rhythm machines (which should be set to MIDI Sync). When you play or record with MUSE, all the devices you've connected in this way will start together, stop together, and be in sync. It is also easy to move sequences from MUSE to another sequencer when they are interfaced this way. (To save time, moving sequences this way can be done at high speed by using a tempo setting of 240.)

To set MUSE to MIDI Sync mode point to SYNC MODE in the Extras Window and click until the word MIDI appears at the bottom of the screen. MUSE will behave differently when set to

MIDI Sync mode: If you select Record or Play, MUSE will wait until it receives a start signal from an external device with a MIDI clock (such as an MSQ-700 Digital Keyboard Recorder or TR-707 Rhythm Composer) before beginning. This external MIDI device must be set to its own Internal Sync. When you start the external device, a start signal is sent to MUSE and playback or record tempo will be synchronized to that device. MUSE is "slaved" to the external MIDI clock and will follow any changes in tempo you make using that clock. If MUSE is recording when you stop the external device, it will continue to the end of the measure being recorded and then stop. If MUSE is playing when you stop the external device, it will remain in Play mode, ready to start again when you start the external device. To terminate Play mode in this case, click with the space bar or joystick button.

MIDI Sync makes it easy to use MUSE with other sequencers like the MSQ-700 and MSQ-100 to increase the power of your overall system. It's great to be able to do all of your sequencing at home with MUSE, and then transfer that sequence data to a dedicated sequencer (like the MSQs) for use in a recording session or live performance. (This is much easier than carrying the computer, monitor, and disk drives around with you.) It is also a good idea to back up your MSQ sequence files by transferring them to floppy disk with MUSE. To do this, set MUSE to MIDI Sync and select RECORD from the command screen. MUSE will wait until you press Play on the MSQ unit, then it will automatically record that MSQ sequence in sync. Once files are transferred to MUSE in this way they can be edited like any other MUSE file, and you can save and load them to disk. (You can even use an external sequencer with MUSE in this way to combine tracks from one song file with the tracks from another. MUSE alone does not currently permit you to combine tracks from different music files.)

Metronome. The Metronome output of the MPU-401 makes an excellent "click track" to follow for staying in time with other tracks. You can listen to it through headphones, amplify it through a speaker, or record it to tape as a click track for other players to follow while recording. If you don't like the pitched

beep of the MPU-401 as a click track, connect the Sync Out jack on the MPU-401 to the Sync In jack of a Roland SBX-80 Sync Box or other popular clock or sync box (set to a timebase of 1). This produces a sharp click sound as used by many film and sound recording studios.

How MUSE uses Memory. Understanding how MUSE uses the computer's memory for storing music data is helpful when working with some of the more advanced features of the program. At the bottom of the command screen is a display showing the amount of memory that is available to use for music data. It's always a good idea to keep an eye on this display while working with the MUSE editor. It is possible to run out of memory in the middle of an edit, but if that happens, MUSE will back up to the last complete measure and end the track.

Functions like Merge, Copy/Chain, and Copy/Edit all use memory. They work by taking music data from one track and moving it to another. Each time this occurs some memory is used. If, for example, two tracks use up over 50 percent of memory (these would be very large tracks), they could not be merged completely since the new track would also need over 50 percent of memory. The end result would be a new track consisting of the merged tracks with some measures missing at the end.

This will also be true for Copy/Chain and Copy/Edit: Each time a track, or portion of a track, is selected to be chained to the end of a new track, some memory will be used. If you are working with large tracks the memory will be used up very quickly. The memory indicator at the bottom of the command screen will move every time you select a track and click. This lets you know that you are close to using up the available memory. A box will appear on the screen to tell you when all available memory is used up.

Though the Auto-Correct function does not create a new track, it does use memory, but only temporarily. If there is little available memory left when you're auto-correcting it will merely happen a bit slower. No measures are truncated by this process.

Generally you will notice that when there is less available memory, MUSE will run a little slower overall. Functions like

Erase and Auto-Locate will take a fraction of a second longer. To conserve memory it's recommended to erase any unneeded tracks whenever possible. If a track is completely edited and finished, save it to disk as a separate song file, then erase it from the file you're working on to make room for editing and auto-correcting the other tracks.

Using a joystick or paddles. The better acquainted you become with using the joystick (or paddles) to work with MUSE, the more you will discover the real power and flexibility of MUSE. Except for entering the names of files to load or save, all MUSE functions can be controlled from the joystick (or paddles). (You should be careful when using the joystick or paddles to control tempo during Play and Record: Getting violent with these controllers may have a bad effect upon the system.)

When shopping for a joystick or paddle controller, try getting the feel of as many different models as you can in order to choose the one that seems best for you. The older paddle-style controllers with one knob and one button are recommended and very easy to use. If you choose a joystick, be sure it has a release for the springs that center the stick. (A self-centering joystick will always point to the middle of the screen when you're not moving the cursor.)

Creating back-up disks. It is a good practice to create copies of important music files on back-up disks kept in a safe place. In the event of loss or damage to your work disks, important files can then be recovered.

TAPE SYNCHRONIZATION

As stated earlier, the Tape Sync Mode enables you to use an external clock signal, known as FSK (Frequency Shift Key), to synchronize the recording and playback tempo of MUSE with a multi-track tape recorder. Now we'll explore the Tape Sync function of MUSE in more detail and offer some guidelines to follow for using it in your recording applications.

In theory, using tape sync is simple: Instead of MUSE's internal clock, a tape-recorded clock signal (FSK) is used to control the playback or recording tempo of sequences. In other words, MUSE becomes "slaved" to the FSK clock signal on tape, which can be considered the "master" controller. To do this you must first record the FSK clock signal generated through the Tape Out jack of the MPU-401 onto a track of your multitrack tape recorder while playing or recording a sequence on MUSE. Then, by feeding the output of that track into the Tape In jack of the MPU-401, you can use this taped FSK clock signal to synchronize the tempo of MUSE sequences, making it possible to record multiple tracks on a tape recorder with each track synchronized to all others in perfect time.

This ability to synchronize the recording of MUSE sequences across multiple tracks increases the power of your system in some important ways. If you're using a four- or eight-track tape recorder you can expand on the limited track space by recording synchronized MUSE tracks and bouncing them together onto other tracks. If you're working with a limited number of MIDI synthesizers you can extend their use and create a "bigger" sound by varying the timbre of sounds on each pass of a synchronized recording. The resulting impression is the same as if you had utilized many more synthesizers in the recording.

Working with Tape Sync can be approached in a couple of different ways depending on your particular application, the nature of the piece you're recording, and the kind of instrumentation you're using. The two basic approaches you will commonly use are:

1. First record tracks on MUSE set to Internal Sync. Next record the FSK clock signal to tape for the duration of those tracks. Then, with MUSE set to Tape Sync, use the taped clock signal to "slave" the playback of your MUSE tracks while you record the output of your MIDI instruments onto multiple tracks of the tape recorder.

2. First record the FSK clock signal to tape for any duration of your choosing. Next, either record tracks on MUSE set to Internal Sync or (with MUSE set to Tape Sync) use the recorded clock signal as "master" controller to record tracks on MUSE. Then, with MUSE set to tape sync, use the taped clock signal to "slave" the playback of your MUSE tracks while you record the output of your MIDI instruments onto multiple tracks of the tape recorder.

Either approach may be used depending on which one you judge to be most useful in a particular situation. The following is a detailed description of the steps involved in taking the first approach to recording with MUSE using tape synchronization.

Before Recording.

The first thing to do is to determine a proper tempo and time signature for the piece you want to record. Once an FSK clock signal has been recorded on tape it is not possible to change the tempo it represents. To change playback tempo at that point, a new clock signal must be recorded from the beginning at the desired tempo. Before recording any clock signal, experiment with the Metronome setting of MUSE to discover an appropriate tempo.

If you're working with a rhythm machine you should also try to determine or approximate the rhythm part you anticipate using on the piece before recording the clock signal. Most popular rhythm machines have a resolution or scaling selector. Experiment with it to decide the proper setting for your piece. To do this, come up with a measure or two of what a typical drum part might be and (with MUSE set to Internal Sync) "slave" the playback of the rhythm unit to MUSE. This way you can hear if the

degree of resolution and "feel" you've established with the rhythm machine is appropriate, and if the tempo and time signature you've chosen are optimal. (Refer to the Roland *Drum Machine Rhythm Dictionary* by Sandy Feldstein, available through RolandCorp US, for more on programming rhythm machines.)

(NOTE: Because MUSE has a capacity of 250 measures it is unwise to select very high tempos that will run the duration of many measures in a very short time. It is best to discover a tempo setting in MUSE and a resolution or scaling setting on your rhythm machine that can accomodate the length of your piece as well as the desired tempo.)

Recording the Clock Signal.

The MPU-401 generates two signals through the Tape Out jack: a carrier or pilot signal, which is a steady high pitch, and the FSK clock signal, which is a modulated tone. The carrier signal is always being output through the Tape Out jack; the clock signal is output only after you select Play or Record from the MUSE command screen.

Always record the clock signal on an outside track of your multitrack recorder, for example, in the case of an eight-track machine it should be recorded on tracks 1 or 8. To avoid confusion, it is advisable to be consistent from piece to piece in your choice of the sync track, for example, always use track 1 or always use track 8. (To prevent leakage to other tracks in your mixing board, we advise you not to record the sync track through the mixing board if at all possible.)

The clock signal should be recorded onto the sync track at an input level ranging from -7dB to 0dB. It may be necessary to experiment to discover the exact point in this range that is optimal for your system. Levels exceeding 0dB may present cross-talk problems between tracks. (See Glossary.) If material is recorded on a track adjacent to the sync track, it may make it difficult for the clock signal to be read properly. If possible do not record on the track adjacent to the sync track, or wait until all sync-related material has been recorded before recording on

that track. If the adjacent track must be used, it is advisable to record material on it that is less percussive.

If your tape recorder utilizes noise reduction, it is advisable to try to defeat the noise reduction when recording the sync track.

Recording the sync track step-by-step.

1. First, connect the Tape Out jack on the MPU-401 to the input jack of a multitrack tape recorder for the track you want to record the clock signal on.

2. Load the music file you want to synchronize to the taped clock signal if you have not already done so. The Sync Mode as indicated in the MUSE command screen status area should be set to Internal. If it is not, go to the Extras Window and select Sync Mode, changing the setting to Internal.

NOTE: When you first record music files on MUSE it is advisable to allow two measures to elapse between the lead-in measures and the moment you actually begin playing the music to be recorded. This allows enough time for the music to be synchronized properly.

3. Press record on the tape recorder and wait about ten seconds to record the carrier signal output from the MPU-401. Now select the Play in the MUSE command screen. This produces the clock signal (a modulated tone) that is output through the Tape Out jack on the MPU-401.

NOTE: Care must be taken to select Play only after enough carrier signal has been recorded on tape first. Recording about ten seconds of carrier signal before selecting Play is ample.

4. When the music you want to synchronize has finished playing, wait until the record mode indicator on the MUSE command screen is off before stopping the tape recorder. Now you have a Tape Sync track that can be used to synchronize the playback of that particular music file.

Controlling Playback of MUSE with the Tape Sync Track.

1. Connect the output jack of the tape track that has the clock signal recorded on it to the Tape In jack on the MPU-401. Care must be taken to adjust the output level of the recorded sync track to be between -7dB and 0dB as indicated on the tape recorder's VU meter.

2. Select Sync Mode in the Extras Window and set it to Tape Sync as indicated in the status area in the lower part of the MUSE command screen.

3. With the tape cued up just before the beginning of the sync track, first start the tape recorder rolling to play back the sync track then immediately select Play in the MUSE command screen. The clock signal recorded on the sync track now controls playback of MUSE.

NOTE: To ensure proper synchronization when recording or playing back with the sync track it is important to cue the sync track so that the carrier or pilot signal that precedes the actual FSK clock signal is output to the Tape In jack on MPU-401 before selecting Record or Play from the MUSE command screen.

Some Guidelines.

Use a Bar Chart. When using tape sync it's useful to keep some kind of written reference for yourself outlining the structure of the MUSE tracks you're working with. This could consist of a simple list or chart identifying the measures recorded and their numbers, and indicating MUSE track or song part references (such as verse, chorus, bridge, etc.). This will help keep things organized when doing any auto-locating, punching-in, or editing of the material recorded with MUSE. The Track Sheet at the end of this manual may be helpful for this purpose.

Tempo Variation. You may want your composition or song to vary in tempo from part to part. These tempo variations can be consistently controlled using tape sync. To do this, you must record the tempo variations you want at the same time you record the tape sync track. As you record the tape sync track,

listen to the playback of the MUSE tracks and use the joystick or cursor control keys to vary the tempo of the music as it plays. The tape sync track will then reproduce all the tempo changes you made when it is used to control the playback of MUSE. The cursor control keys may be used to fine tune the tempo, as they increment the playback tempo one beat per minute, up or down. Use the joystick or paddles for tempo variations that do not require fine tuning.

Lead-in bars. When recording with MUSE set to Internal Mode you are automatically given a two-bar lead-in before actual recording begins. When recording in Tape Sync Mode there is no two bar lead-in. Recording begins immediately when the tape sync track triggers MUSE to begin. Because of this, when you use tape sync it's recommended to first record a couple bars of rest as lead-in before the music is to begin. This will afford you ample time for cueing purposes when doing any overdubs in Tape Sync Mode.

Recording in Tape Sync Mode. There are a couple important considerations when using the tape sync track to drive the program while recording tracks on MUSE. As stated earlier, to ensure proper synchronization when the sync track is driving MUSE, it is important to cue the sync track so that the carrier or pilot signal that precedes the actual FSK clock signal is output to the Tape In jack of MPU-401 before you select Record. Also, when you are recording on MUSE in Tape Sync Mode and wish to terminate the recording process by pressing the paddle button or space bar, you should wait for the Record indicator in the status area of the command screen to turn off before you stop the tape recorded sync track. If you stop the tape recorder immediately rather than waiting for the MUSE Record indicator to turn off, the MUSE program could lock up. This is because MUSE is waiting for a signal from the tape sync track that the current measure has ended. To remedy this situation in the event of a lock-up, merely start the tape from where you stopped it and allow the tape sync track to continue playing to the end of the current bar of music.

Editing and Tape Sync. The punching in and out feature of MUSE is not available when in Tape Sync Mode. This is because in order to record or playback MUSE while driven by the tape recorded FSK clock signal it is always necessary to start at the very beginning of a piece to ensure proper synchronization. This does not mean, however, that the powerful editing features of MUSE cannot be used when working with a piece in Tape Sync Mode. The approach is very simple:

Once you have created a tape sync track for an entire piece of music, switch MUSE to Internal Mode in order to do any editing, auto-locating, punching-in, or punching-out. Then, when you are finished with your edits or punch-ins, return to Tape Sync Mode to record those corrected tracks to tape in perfect synchronization with the others.

Tape Sync and Non-MIDI Instruments. In some instances you may wish to record a piece of music using MUSE in Tape Sync Mode along with non-sequenced material including other instruments that do not use MIDI or are acoustic. To do this, start by selecting the appropriate metronome setting and time signature on MUSE for the piece you want to record. If you're working with a rhythm machine be sure the resolution setting is correct and the basic feel of the rhythm part is to your liking. First record the sync track for the piece, then use it to drive the recording onto another track of a reference click track consisting of the rhythm machine part or the metronome, or both combined. This track should be used as a timing reference for other non-MIDI or acoustic instruments to follow when you record them. When all the non-MIDI or acoustic tracks have been recorded, this reference click track can be erased to free up track space. Since this reference click track is in sync to the other MUSE tracks via the tape recorded clock signal, any instruments that use it as a timing reference when being recorded will also be in sync with the other MUSE tracks.

GLOSSARY

ADDITIVE SYNTHESIS: A technique for producing complex waveforms by combining together several sine waves tuned to pitches in the natural harmonic series. *See also* SUBTRACTIVE SYNTHESIS.

AM SYNTHESIS: A technique in which the amplitude of a signal is modulated to produce a timbre. *See also* FM SYNTHESIS.

ANALOG: (1) Something that bears a correspondence with something else. (2) A type of electrical signal whose frequency and level vary continuously in direct correspondence to the original acoustical sound waves it represents. "Analog" also may refer to a control device or circuit that continuously changes the level of an electrical signal in a direct relationship to the control setting. (3) Exhibiting continuous electrical fluctuations that correspond in a one-to-one fashion with the audio output; the opposite of digital. In analog synthesizers, both control signals and audio signals may take on any voltage value in a continuous spectrum. *See also* DIGITAL.

ANALOG SEQUENCER: A sequencer in which the signals to be played back are stored mechanically rather than in digital memory. *See also* MEMORY; SEQUENCER.

AFTERTOUCH: *See* RELEASE VELOCITY; TOUCH SENSITIVITY.

AUTO-CORRECT: A process in MUSE that scans recorded MIDI music data to correct rhythmic inaccuracies. A resolution is selected for the smallest rhythm and any notes not falling on those fractions of a beat are moved to the nearest one.

AUTO-LOCATE: A MUSE program feature that enables you to locate any measure you specify in a recorded piece of music.

BACK-UP: A reserve copy of a disk containing data that is made in case of the unforeseen loss or damage to the original disk. It is a good idea to keep back-up disks of important music files. *See also* DISK.

BAUD: The rate that binary data is transmitted in bits per second between computer devices. Most computer modems send data at 300 bits per second over telephone lines. MIDI sends data at 31,250 bits per second. *See also* BIT; BYTE.

BEND: To change pitch in a continuous sliding manner using a pitch-bend wheel, lever, or ribbon.

BIT: Short for binary digit. Bits are small amounts of electrical energy used by a computer to represent numbers. Bits are usually put into groups of eight called bytes. *See also* BYTE; BAUD; K.

BLOCK DIAGRAM: A schematic-like drawing illustrating the main circuit blocks and signal flow in an electronic device or system, but not showing all specific wiring details.

BOOT: The process of running a short program to get the computer to operate. This is usually done automatically when the computer is turned on with a disk in it.

BOUNCING TRACKS: A term synonymous with "ping pong," which means to move recorded information from two or more tracks into one. *See also* PING PONG.

BUS: A signal path to which a number of inputs may be connected for feed to one or more outputs. In a mixing console a bus is usually a long piece of wire to which any input channel can be connected by means of a switch or control. *See also* MIX.

BYTE: Eight bits, usually the smallest unit used by a computer when processing information. *See also* BIT; BAUD; K.

CENTRAL PROCESSING UNIT (CPU): An electronic module that searches, decodes, and executes in the proper sequence instructions stored in a computer's memory. The CPU usually consists of a microprocessor chip and a few other components residing on a single circuit board or "card." *See also* COMPUTER.

CHANNEL: Refers to the sixteen channels that MIDI data can be sent over. MIDI instruments can be set to receive data on all or any one of these channels for producing sound. *See also* OMNI; POLY.

CHIP: An integrated circuit contained on a small silicon square mounted on a plastic or ceramic carrier. The carrier is a block with several metal pins that can be plugged into a receptacle on a printed circuit board.

CLICK TRACK: (1) In motion picture, television, or other recordings, an electronic metronome is applied to the audio recording so that musicians can synchronize the musical tempo with the visual action or frame rate. The track containing the metronome signal is known as the click track. (2) A timing reference signal recorded on tape that contains a single click for each basic beat (such as a quarter-note) of a song. *See also* SYNC.

CLOCK: One of two types of timing control devices: A low-frequency pulse clock normally puts out one gate and/or trigger signal for each event to be initiated, and may be used as an adjustable-speed automatic trigger for a sample-and-hold, analog sequencer, envelope generator, and so forth; an audio-rate sync clock puts out a pulse with which various digitally controlled devices can be synced to one another, or to a tape track containing the sync clock signal. Typical clock rates are 24, 28, and 96 pulses per quarter note.

CODE: Generally, any set of characters that stand for different characters. Every programming language is a code in which characters stand for different combinations of ones and zeros.

Therefore, we refer to the written lines of a program as lines of code. MIDI may also be considered a code since it uses numbers to represent the various parameters of musical performance. *See also* MIDI; PROGRAM.

COMPUTER: A self-contained device including at least a central processing unit (CPU), memory, basic interfaces that allow it to communicate with the outside world, and a power supply. It usually includes a keyboard, a screen, and disk drives. Computers are capable of storing and executing programs. It communicates with the outside world by means of input/output devices, such as a keyboard (input) and monitor or printer (output). Additional memory may be in the form of disk drives or cassette recorders. A computer system is a group of electronic devices that work together not only to process data, but to communicate to and from the outside world with peripheral devices connected to it, such as a modem or MIDI interface. *See also* CENTRAL PROCESSING UNIT (CPU).

CONTROLLER: (1) A device capable of producing a change in some aspect of a sound by altering the action of some other device. Examples of controllers include keyboards, pitch-bend devices, and envelope generators. (2) A MIDI device that may or may not produce sound in itself but generates MIDI data and can be connected to MIDI sound sources. An example of a MIDI keyboard controller that does not produce sound in itself is the Roland MKB-1000. *See also* JOYSTICK; PADDLE.

CROSSTALK: An undesired signal appearing in one tape track or channel as a result of leakage from another track or channel, usually specified in dB (decibels). *See also* dB.

CURSOR: A symbol used to indicate the current position at which a character will be displayed on the screen. Specialized keys on the computer keyboard are usually assigned to position the cursor, which typically appears as a blinking square or underline on the screen. The MUSE cursor is the lit bar that points to various functions on the screen when you move the

joystick or type the computer's cursor keys. When entering a number in MUSE the cursor appears as an underline mark.

DATA: The text or numbers on which a computer program can perform various operations. Data is manipulated by a computer and arranged into groups that convey meaning.

dB (abbreviation for **DECIBEL**): A unit of measurement for ratios of sound level, power, voltage, and other quantities. The dB is only meaningful when referenced to some actual value.

DCO: Stands for Digitally Controlled Oscillator. This term is used on synthesizers whose oscillators can be directly controlled digitally because they are digital oscillators. The analog oscillators on analog/digital hybrid instruments are ultimately controlled digitally as well, but the control signals are often sent through a digital-to-analog converter to convert them to analog voltages before arriving at the oscillators' control inputs.

DECIBEL: *See* dB.

DELAY LINE: A device that delays an audio signal by a certain length of time, usually from 0 to 500 milliseconds (1/1000 of a second). Commonly used in recording and live performance for echo and special effects. Recent models of digital delay lines (such as the Roland SDE-2500) use MIDI to store and recall front panel settings with MIDI Program Change commands.

DIGITAL: (1) A numerical representation of the actual analog frequency and level of an audio signal. Digital also may refer to a control or circuit that changes the level or the assignment of a signal in discrete mathematical steps rather than continuously variable amounts. (2) Generally, the use of numbers to represent information. Computers use digital memory which stores all information as the numbers 0 and 1 (called binary). Digital code can be converted and used to represent any type of information. *See also* ANALOG.

DIGITAL OSCILLATOR: An oscillator (a source of a periodically repeating waveform) in which the specific waveshape to be generated exists in the form of a series of numbers (the wavetable) that describes the height of the waveshape at various points in time.

DIGITAL SEQUENCER: A sequencer in which the signals to be played back are stored as numbers in a digital memory. MUSE is a digital sequencer which stores MIDI data. *See also* SEQUENCER.

DIN (acronym for **DEUTSCHE INDUSTRIE NORMEN**): German Industrial Standards, in audio, the German set of standards for audio connectors, and so forth that is widely used throughout Europe. MIDI uses a standard five-pin DIN connector to transmit MIDI information between devices.

DISK: Magnetic medium on which data and programs can be stored. The information is stored as files that can be retrieved by name. Disks can store a large amount of data and are common with small computers as a mass storage medium. *See also* COMPUTER; DISK DRIVES; FLOPPY DISK.

DISK DRIVE: The mechanism used to read and write from a disk. *See also* COMPUTER; DISK.

DUB: A copy of a recording, usually a taped copy, but sometimes a lacquer disc (phonograph record). To "make a dub" or to "dub a recording" is to copy it, though not necessarily in the same tape format. Dubs are generally used for reference purposes.

EDIT MODE: A mode of operation of a programmable synthesizer in which front-panel controls can be used to make temporary changes in the values stored in memory. In a digital sequencer, edit mode refers to a mode setting in which the notes or tracks stored in the sequence can be changed.

EDITING: The process of adding to, subtracting from, or rearranging a recording or sequence. May be done by manually by cutting and splicing the actual tape, electronically by playing and re-recording various portions of the program, or by digital manipulation of musical data.

EDITOR: A computer program designed to facilitate the entering and modifying of text or other data. Used to remove errors or make changes while entering data.

ENTER: To send information from a keyboard, panel switch, or other device (such as a joystick), directly to the computer. When a user gives a command to the computer, the command is entered when the user hits the Return key or clicks on an input device button.

EQUALIZATION (abbreviated as **EQ**): The intentional increase in level of certain portions of the audio frequency spectrum. Sometimes the term is misapplied when actually referring to the attenuation of portions of the audio frequency spectrum.

FILE: A collection of data that has been given a name. A program is usually stored on a disk as a file. In MUSE, music sequences are stored on disk as music files.

FLOPPY DISK: A type of memory for a computer that uses a thin round piece of mylar coated with a magnetic material inside a heavy paper or plastic jacket. Programs and files are stored by the computer onto floppy disks by copying portions of the computer's memory. They may then be retrieved by the computer at a later time when needed. *See also* DISK and DISK DRIVE.

FM SYNTHESIS: A technique in which frequency modulation (FM) is used to create complex tone colors in synthesized sounds. *See also* AM SYNTHESIS.

GAIN: The amount an amplifier increases the power of a signal, usually specified in dB. *See also* dB.

HARDWARE: The physical equipment, including the computer, the disk drives, the monitor, the printer, interface devices, synthesizers, and so forth that make up a computer system. *See also* COMPUTER.

HIGH-LEVEL LANGUAGE: A programming language designed to facilitate giving instructions to the computer. C and BASIC are high-level languages.

IC (abbreviation for **INTEGRATED CIRCUIT**): An ultra-miniaturized, solid state electronic circuit device that contains the equivalent of many discrete components such as transistors, diodes, resistors, capacitors, and so forth. Often referred to as a chip. An IC may be an amplifier, a digital processor, a memory device, etc. *See also* CHIP.

INITIALIZE A DISK: A process performed by a computer on command to record various signals on a disk as markers. In subsequent use, the computer can find a location on the disk by counting these markers. A disk must be initialized before programs or data can be stored on it. *See also* DISK.

INPUT LEVEL: Refers to the level in dB, dBm, or volts that is acceptable for an input signal to a particular connector in any given piece of electronic equipment. Such input levels are rated either as maximum (i.e., the level above which overdrive distortion occurs) or as normal (i.e., the average level which would be fed to the input under normal operating conditions). *See also* dB.

INTERACTIVE: A type of computer program or an approach that allows a person to influence the course of the program while it is running. Interactive programs allow you to work with information in a faster, easier manner.

INTERFACE: (1) The place where two things come together. A synthesizer's front panel is the interface between the musician and the instrument. Two instruments are said to be interfaced when their operations are linked electronically, for example,

when the tone-generating circuitry of one can be played from the keyboard of another via MIDI. (2) Anything that makes it possible for two entities to communicate with each other. An example is a printed circuit board that alters data so it can be transmitted to and from a computer and some other device. MIDI data is transmitted through an interface consisting of circuitry and cables. *See also* MPU-401; PARALLEL INTERFACE; SERIAL INTERFACE.

I/O (abbreviation for **Input/Output**): The part of a computer through which signals pass to and from the CPU and peripheral devices such as printers, disk drives, monitors, keyboards, or remote terminals. *See also* COMPUTER; CENTRAL PROCESSING UNIT (CPU).

JACK: Female receptacle for a plug (or male-type connector). *See also* PHONE PLUG; PLUG.

JOYSTICK: A controller not unlike a small, freely moving gearshift lever, which puts out two independent control voltages simultaneously, one determined by its left-right position (the X-axis) and the other by its toward-away position (the Y-axis). *See also* CONTROLLER.

K: Abbreviation for kilobyte, or 1,024 bytes. *See also* BIT; BYTE.

KEYBOARD: A controller used primarily for playing traditional melodic and harmonic patterns on an analog synthesizer. A synthesizer keyboard sends a control voltage to the oscillators, and gate and trigger signals to the envelope generators. On MIDI instruments the keyboard controls the synthesizer sound circuits as well as generating a MIDI signal.

LEVEL: A term loosely used to describe the amplitude of a signal or a sound. More precisely, it is the value of that signal or sound relative to a given reference, expressed in dBm, DB SPL, etc. *See also* dB.

LOOP: The ability of a sequencer to continuously repeat a song, a track, or section of a song.

MAGNETIC MEDIA: A material, usually plastic, coated with a substance, usually iron or chromium oxide, that can store information in the form of magnetic impulses. Typically magnetic media comes in the form of tape or as a disk. *See also* DISK.

MASTER: Any device that controls the operation of other components. For example, a master oscillator is one to which another oscillator is synced, while a master clock is one that controls the timing of other (usually external) devices. A MIDI sequencer or drum machine may function as either a master, controlling the clocks of other MIDI devices, or as a slave by being controlled by another. *See also* SLAVE.

MASTER UNIT: When there are two or more electronic devices and only one device is in control, it is called the master unit and the others are called slave units. *See also* SLAVE.

MEMORY: (1) The part of a computer system that holds data. Memory can be inside the computer in special chips, or it can be outside the computer, in mass storage such as disks. (2) A system of information storage. Synthesizer memories are generally digital, and are used for storing patches, keyboard split points, sequences of notes, and so on. *See also* CHIP; COMPUTER; DISK.

MENU: The list of user's option displayed in a computer program. *See also* COMPUTER; PROGRAM.

MIDI (acronym for Musical Instrument Digital Interface): A specification for the protocols by which digital information is transmitted from one synthesizer to another, or between synthesizers, sequencers, drum machines, and computers. *See also* INTERFACE; MPU-401.

MIX: The procedure whereby two or more signals from live and/or recorded sources are combined to achieve a desired

balance. Mixing consoles provide separate level controls for each source, as well as overall controls for the mixed (combined) signal. Consoles may also provide equalization and auxiliary signal processing such as echo and reverberation. Mixdown refers to a process whereby signals from a multi-track tape recorder are routed to a mixing console and recombined to make a stereo or monaural master tape.

MIXER: A device or system in which two or more signal sources (microphone or line level) can be combined and fed to another device or part of the audio system. Larger mixers are often called mixing consoles especially if they are designed for mixing many inputs or feeding many outputs. The term mixer is generally reserved for units with a smaller number of inputs and outputs, and for rack-mounted mixing equipment. *See also* MIX.

MODULE: A hardware device designed to make some particular contribution to the overall process of synthesis.

MONITOR: A device that allows you to examine something. Usually the term means a cathode ray tube (CRT) display. *See also* COMPUTER.

MONO MODE: One of the three basic operating modes of MIDI. In Mono mode, an instrument's voices may each be assigned to be played by a different MIDI channel. Most multi-timbral synthesizers work in this mode. *See also* MIDI; OMNI MODE; POLY MODE.

MONOPHONIC: *See* POLYPHONIC.

MOUSE: A device that is attached to a computer by a long cable and which is rolled along a flat surface by hand. As it rolls, it controls the movement of a cursor on the computer's display. A mouse controls the cursor's direction and speed. Usually, a mouse also has a button or buttons for selecting menu items from the display or for giving commands to the computer. *See also* COMPUTER; CURSOR.

MPU-401 MIDI Processing Unit: An intelligent MIDI interface for personal computers made by Roland. *See also* INTERFACE; MIDI.

MULTI-TRACK RECORDER: A sequencer with two or more tracks for recording, overdubbing, and editing. Also refers to certain tape recorders with two or more channels that utilize separate heads for record and playback functions, and that have a sync mode. When multi-track recorders are used in sync mode, the record head is used for both record and play functions so that additional tracks can be recorded while performers listen to previously recorded tracks. *See also* MIX; OVERDUB; SEQUENCER.

MUSE: (1) A source of inspiration, a guiding genius, a poet. (2) Acronym for MIDI Users Sequencer/Editor, an advanced MIDI software system manufactured by Roland. *See also* SOFTWARE.

MUTE: Selectively turning a recorded track off for playback.

NON-VOLATILE MEMORY: A type of memory in which the information is retained when the instrument is unplugged, usually through the use of a built-in rechargeable battery. Magnetic disks and tape are also considered non-volatile memory. *See also* MEMORY; DISK.

OMNI MODE: One of the three basic operating modes of MIDI. In Omni mode, an instrument responds to information that it receives over any of MIDI's sixteen channels. This is the mode that most all MIDI instruments power up into. *See also* MIDI; MONO MODE; POLY MODE.

OPEN TRACKS: Tracks on a multi-track tape or sequencer that have not yet been recorded (or that are erasable), and are hence available for overdubs. *See also* MULTI-TRACK RECORDER.

OPERATING SYSTEM: A special program or group of programs that controls all the activities of a computer system. For example, an operating system might control the transfer of data to and from peripheral devices, might determine where to put programs and other data in memory, and so on. *See also* COMPUTER.

OVERDUBBING: A recording procedure utilized in multi-track recording. A performer (or performers) listens to previously recorded musical tracks, typically with headphones, while recording one or more additional tracks on to the same tape or to a sequencer. *See also* DUB; MULTI-TRACK RECORDER; SEQUENCER.

PADDLE: Interface device for computers consisting of a knob or dial and a button. *See also* COMPUTER; INTERFACE.

PARALLEL INTERFACE: A connection between two devices through which digital information is transferred several bits at a time via wires. Parallel connection, while very fast, cannot be used over distances of more than a few feet. *See also* INTERFACE; SERIAL INTERFACE.

PATCH (PATCHING): A process of routing or rerouting audio signals using patch cords. Also, in electronic music synthesizers, the combination of connections and control settings that produces a particular sound.

PERIPHERAL: A device external to the CPU and memory of a computer. For example, disk drives, printers, light pen, keyboards, CRT displays, or an MPU-401. *See also* CENTRAL PROCESSING UNIT (CPU); COMPUTER; DISK; MEMORY; MPU-401; MONITOR.

PERSONAL COMPUTER: Any microcomputer that is small enough that many individuals can afford it. These computers are for business, professional, musical, and home use, among other things. They have made computers available to large numbers of people for the first time. *See also* COMPUTER.

PHONE PLUG (or PHONE JACK): Describes any of several varieties of two-conductor audio connectors commonly used for unbalanced audio signal connections having a quarter-inch shaft diameter. The male connector is the plug and the female receptacle for it is the jack. *See also* JACK; PLUG.

PING PONG: (1) In a sequencer this refers to moving and combining digital information to free up tracks on the system. This process has no effect on the sound quality of the music being mixed. (2) A multi-track tape recording procedure whereby several recorded tracks are played back synchronously, mixed into one track, and re-recorded on any open (unrecorded) track. This procedure is done to make additional tracks available and may be repeated. *See also* MIX; MULTI-TRACK RECORDER; SEQUENCER.

PITCH-BENDING: *See* BEND.

PLUG: Male connector for a jack (female-type receptacle). *See also* JACK; PHONE PLUG.

POLY MODE: One of the three basic operating modes of MIDI. In Poly mode, an instrument responds to all information arriving on whatever specific numbered channel it is currently assigned. Note that MIDI's channels are not separate electrical connections but merely data designations within an ongoing stream of data. *See also* MIDI; MONO MODE; OMNI MODE.

POLYPHONIC: Capable of producing more than one independently moving pitch line simultaneously. Monophonic, by contrast, means being capable of only a single pitch line.

POLYPHONIC SEQUENCER: A digital sequencer capable of storing and playing back several independent musical lines simultaneously. *See also* SEQUENCER.

PRESET: A single button that, when pushed, sets up most of all of an entire patch instantly. Also refers to a type of synthesizer equipped with presets. At one time a preset instrument

was one that had buttons labelled "trumpet," "violin," and so on, but today the term is being used synonymously with "patch" in user-programmable instruments. *See also* PATCH.

PRESSURE SENSITIVITY: A type of touch sensitivity in which the keyboard senses how hard a key is being pressed down after it has reached and is resting on the key bed. This is also called aftertouch. Pressure sensitivity can be either monophonic (one pressure-sensing device runs under the entire length of the keyboard and only one control signal is put out, which represents the total amount of pressure on the keyboard at any given moment) or polyphonic (each key has its own pressure sensor).

PROGRAM: (1) A list of instructions for a computer to follow. A program is written in a programming language and can be stored in the computer's memory. The original version of the program, written by a programmer, is called source code and may be written on paper, punched on paper cards or tape, or entered directly into the computer's memory. In any case, it must be in the computer's memory before it can be run on that computer. *See also* COMPUTER; MEMORY.

(2)*a.* One of the sets of information about front panel settings in a programmable synthesizer; or *b.*, To create a new program for such a synthesizer. MIDI contains a Program Change code to indicate the program buttons that are selected and sends this data to other synthesizers to also change to the same program number. *See also* MIDI; SYNTHESIZER.

PROGRAMMING LANGUAGE: One of many codes in which programs are written by programmers. The lowest level of programming languages is machine language, which consists of only ones and zeros. Assembly language is the next higher level. Most programming languages are high-level, such as BASIC, PASCAL, C, FORTRAN, or COBOL. *See also* COMPUTER.

PUNCH IN: A procedure in multi-track recording that is essentially an overdub, but instead of recording the new part on

an adjacent track to already recorded material, the new part is recorded by erasing a previous part from a given track. MUSE provides the ability to punch in, but will not erase any previous track data unless you specifically select the Erase Track function. *See also* MULTI-TRACK RECORDER; OVERDUB.

RAM: Acronym for Random Access Memory. While storing information, the computer can get data from any one location in RAM. A RAM card is a plug-in printed circuit board that increases the internal memory of a computer. *See also* COMPUTER; MEMORY; ROM.

REAL-TIME: A situation in which events (such as keystrokes) are entered in a computer memory at a speed directly proportional to the speed at which they will be played back. *See also* MEMORY; SINGLE-STEP MODE.

RELEASE VELOCITY: The speed at which a key is raised after being depressed. Release-velocity sensing is a feature on some velocity-sensitive synthesizer keyboards, and is usually used to control the length of the release segment of a sound. MIDI can record release velocity data for sounds created on such synthesizers equipped with MIDI. *See also* MIDI.

REMOTE KEYBOARD: A keyboard module that is not built into the same housing as the tone-generating circuitry it controls, but rather communicates with this circuitry via MIDI or some other data transmission system. A remote keyboard may be either a keyboard controller module with no internal synthesizer circuitry, or a full-function synthesizer that is being used as a master keyboard for controlling some other instrument. *See also* CONTROLLER; MODULE.

ROM: Acronym for Read-Only Memory. This kind of memory holds data permanently that cannot be changed by the user. Most all computers have some amount of ROM. *See also* COMPUTER; MEMORY; RAM.

SAMPLING: The digital process of encoding an analog signal by reading its level at precisely spaced intervals of time. Some form of sampling is used in an analog-to-digital converter to read the analog audio input and convert it to digital information. *See also* ANALOG; DIGITAL.

SAMPLING RATE: The number of samples taken per second. When analog audio signals are converted to digital form, the sampling rate must be at least twice the frequency of the highest harmonic in the sound to be sampled, in order to prevent unacceptable samples. *See also* SAMPLING.

SEQUENCE: A set of voltages or a set of MIDI commands stored in a sequencer. *See also* MIDI; SEQUENCER.

SEQUENCER: A device that records and puts out a user-determined set of commands, usually keystroke commands or control voltages. A sequencer uses some type of clock to determine its rate of playback. *See also* CLOCK.

SERIAL INTERFACE: A connection between two devices in which digital information is transferred one bit after another, rather than two or more bits at a time (which requires a parallel interface). MIDI is a serial connection that transmits up to 31,250 bits each second. *See also* BIT; COMPUTER; DIGITAL; INTERFACE; MIDI.

SINGLE-STEP MODE: A method of loading events into memory one event at a time, which usually entails separately entering information about the timing of the events. *See also* MEMORY; REAL-TIME.

SLAVE: Any device whose operation is linked to and governed by some other device called a master, such as a master keyboard or master clock. *See also* MASTER.

SMPTE: (pronounced sim-tee) Acronym for Society of Motion Picture and Television Engineers. Also refers to a common standard for measurement of intermodulation distortion and for a

standard for identification of frames of film or videotape. SMPTE code is a standard protocol developed by the Society of Motion Picture and Television Engineers for synchronizing various devices such as tape recorders, motion picture cameras, and videotape players. *See also* SYNC.

SOFTWARE: Programs, or a set of instructions enabling the computer to do something. MUSE is software. *See also* COMPUTER; MUSE; PROGRAM.

SONG: (1) A finished piece of music. (2) A list of sequencer or drum machine patterns that can be played back in the desired order. Some sequencing devices also allow such information as tempo changes and patch programming changes to be stored as steps in a song. *See also* PATCH; SEQUENCER.

STANDARD PHONE PLUG (or STANDARD PHONE JACK): *See* PHONE PLUG.

SUBTRACTIVE SYNTHESIS: The technique of arriving at a desired tone color by filtering waveforms rich in harmonics, such as pulse and sawtooth waves. Subtractive synthesis is the type generally used on analog synthesizers.

SYNC: (1) Short for synchronization. Two devices such as sequencers, drum machines, and arpeggiators are synced when the clock output of one is patched to the external clock input of the other, so that the timing of the notes they play will remain coordinated. MIDI contains a code for synchronizing multiple clocked devices. (2) In multi-track recorders, a technique where channels on the record head can be used for tape play back while other channels are being recorded. This permits performers to listen to previously recorded tracks and to record additional tracks in perfect synchronization. *See also* CLICK TRACK; CLOCK; MULTI-TRACK RECORDER; SMPTE; SYNC TRACK.

SYNC TRACK: A timing reference signal recorded on tape that consists of a sync tone usually containing 24, 48, or 96

pulses per quarter-note. A sync track is intended to be patched directly to devices such as drum machines and sequencers that will accept the appropriate clock input, as distinguished from a click track, which is mainly designed to be listened to by human musicians. *See also* CLICK TRACK; CLOCK; SMPTE; SYNC.

TAPE SPEED: Standard speeds used for professional recording measured in inches per second (ips): 7 1/2, 15, and 30ips.

TAPE WIDTH: Standard widths used for professional tape, measuring quarter inch, half inch, one inch, and two inches.

TIME SIGNATURE: The marking that indicates the meter of a piece of music. The time signature shows both the number of beats per bar and how the beats are divided up.

TOUCH-SENSITIVE: Equipped with a sensing mechanism that responds to variations in velocity or pressure with corresponding variations in a control signal output that is separate from the main output of a module. *See also* RELEASE VELOCITY.

TRACK: (1) A block of MIDI data stored in the sequencer as a separate part such as bass, lead, rhythm, and so forth. MUSE can hold up to eight tracks of MIDI data. (2) The path on magnetic tape along which a single channel of sound is recorded. *See also* MULTI-TRACK RECORDER; MIDI; MUSE; SEQUENCER.

VCA: Stands for Voltage-Controlled Amplifier. A module that responds to a change in voltage at its control input by altering the amount of gain of a signal being passed through it. *See also* GAIN; VCF; VCO.

VCF: Stands for Voltage-Controlled Filter. A filter whose cutoff frequency and perhaps resonance amount can be changed by altering the amount of voltage being sent to a control input. *See also* VCA; VCO.

VCO: Stands for Voltage-Controlled Oscillator. An oscillator whose frequency and perhaps waveform can be changed by altering the amount of voltage being sent to a control unit. *See also* VCA; VCF.

VELOCITY SENSITIVITY: A type of touch sensitivity in which the keyboard senses how fast the key is descending while it is still in motion. Velocity sensitivity emulates the touch response of the piano, though the velocity information can often be used to control other parameters of the sound than the loudness. MIDI can transmit velocity information to other keyboards or to sequencers. *See also* MIDI; TOUCH-SENSITIVE.

VOICING: Voicing may refer to the fine adjustment of a synthesizer to achieve a particular sound or effect.

VU: A unit of volume. A change of one VU is the same as a change of one decibel for a sine wave. VU is more specifically used to describe the level of complex waves, such as speech or music. *See also* dB.

WHEEL: A controller used for pitch-bending and/or modulation of a sound produced by a synthesizer. The wheel is normally set vertically in a panel with somewhat less than half of its edge protruding in a position accessible to the left hand.

WRITE: When a device sends data to another device, for example when a computer puts data out to a disk drive, it is writing to that device. *See also* COMPUTER; PERIPHERAL.

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--Jeffrey Rona, MUSE author

MUSE Track Sheet

Title: _____
Date: _____
Artist: _____

Track	Channel	Notes
1		
2		
3		
4		
5		
6		
7		
8		

Notes :

MUSE Track Sheet

Title: _____
Date: _____
Artist: _____

Track	Channel	Notes
1		
2		
3		
4		
5		
6		
7		
8		

Notes :